

Personal Computer

US \$2.50/FF 18.50/SFr 7.30/IR £1.41/BFr 99.00/
Lire 5,700/DKr 27.00/DM 9.5

World March 1985 95p

What's Sinclair
driving
at?

BRITAIN'S BIGGEST MICROCOMPUTER MAGAZINE



LET BATTLE COMMENCE
Commodore and Atari micros previewed

Silicon Valley



Join hundreds of leading companies – come to Silicon Valley in the heart of London for the very best hardware, software, training and above all – SERVICE.

The B.B.C., British Telecom, Coopers and Lybrand, Express Newspapers, Imperial College, London Business School, The First National Bank of Chicago, McDougall, The National Computing Centre, Rank Xerox, Thames Water Authority, The Institute of Chartered Accountants...

These are just some of the many hundreds of companies and organisations who have dealt with us over the years.

Why do they come to Silicon Valley? Because whether you're a first time user or an established computer professional we try harder to provide friendly, helpful advice; a fuller service and better deals.

Whether you want the latest sophisticated multi-user system, accounts software or simple add-ons we can supply you quickly from our large depth of stock.

Shown above are just three of the many computers we can offer. From

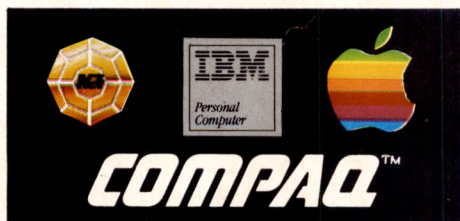
left to right they are: the Macintosh from Apple, the New AT from IBM and the Apricot from ACT.

What about our service?

We have our own workshops, stores and maintenance facilities at our premises, which enable us to provide a comprehensive after-sales service.

We also offer a full range of training programmes for you and your staff.

**BUY RENT OR LEASE
FROM THE PROFESSIONALS**



We are authorised dealers for the above

TEL: 01-833 3391



**164 Grays Inn Road,
London WC1**

I am interested in the following.
Please send me further information.

- HARDWARE ☐
- SOFTWARE ☐
- WORD PROCESSING ☐
- NETWORKING ☐
- COMMUNICATIONS ☐
- TRAINING ☐
- COMPUTER SYSTEMS ☐
- GENERAL ADVICE ON ☐
- MICROS ☐
- SUPPLIES ☐

Name _____

Position _____

Company _____

Address: _____

Tel No: _____

Everyone can benefit from Effective Micro Training at Digitus

NEXT COURSE DATES

Introduction to Personal Computers Provides a basic understanding of microcomputer hardware, software and peripherals. Establishes the criteria for selecting and using micros. Explains the rudiments of programming. 1 day. £105.	Mar 18	Spreadsheets with SuperCalc A workshop course with advice on the design of worksheets and on solving practical problems. 1 day. £105.	Mar 21	WordStar Workshop A workshop to consolidate basic skills and teach advanced commands. 1 day. £105.	Mar 12
Introduction to DOS Provides a concentrated introduction to PC/MS DOS. Also reviews hardware components and popular applications. 1 day. £105.	Mar 25	Spreadsheets with Multiplan A practical workshop course on this popular spreadsheet package. 1 day. £105.	Mar 1	MailMerge Efficient use of WordStar for mailing using MailMerge. 1 day. £105.	Mar 13
Lotus 1-2-3 A workshop course with advice on the design of worksheets and on solving practical problems. 1 day. £105.	Mar 26	Information Management with Cardbox A workshop course on design, applications and implementation. 1 day. £105.	Mar 15	Wordprocessing with Multimate A practical workshop course which teaches basic skills. 1 day. £105.	Mar 19
1-2-3 to Symphony A practical conversion workshop for existing 1-2-3 users. 1 day. £105.	Mar 4	Working with dBASE II Teaches the user how to build and enquire from files and generate reports. 1 day. £105.	Mar 4	Wordprocessing with DisplayWrite 2 A practical workshop teaching basic skills on this increasingly popular IBM-oriented wordprocessing package. 1 day. £105.	Mar 20
Introduction to Symphony Provides a concentrated introduction to the main elements including spread-sheeting, graphics, information management and "managers" wordprocessor. Teaches the basic skills needed to use these features. 2 days. £210.	Mar 5	Programming with dBASE II Teaches programming using the dBASE procedure language and also file design and indexing. 2 days. £210.	Mar 5	UNIX An introduction to the facilities of the UNIX multi-user operating system, including the file system, shells and editors, and a review of the problems of system management. 3 days. £375.	Mar 18
Symphony Workshop Consolidates basic skills and teaches advanced features including building systems with the integrated package and command language. 2 days. £210.	Mar 7	dBASE II Workshop Builds on existing dBASE skills to teach the more advanced use of the procedure language and the practical application of all these facilities. 2 days. £210.	Mar 7	UNIX Workshop Further skills for those with responsibility for a UNIX system. 2 days. £250.	Mar 22
		Wordprocessing with WordStar A practical workshop course which teaches basic skills. 1 day. £105.	Mar 11	The C Programming Language A tutorial on the main features of the C language, with extensive practical sessions on a multi-user system. 2 days. £250.	Mar 25

All course fees are subject to VAT

The following courses are also held on a regular basis.
Please send for details of next available dates.

Advanced Lotus 1-2-3 Builds on existing Lotus 1-2-3 skills, presenting information on database, statistical and file functions. 1 day. £105.
Data Management with Delta Teaches how to design, define and implement systems using this powerful data management package. 1 day. £105.
Fundamentals of BASIC Develops the first principles of BASIC programming so that you can produce programs on a microcomputer. Gives practical hands-on experience of micros. 2 days. £210.

Introduction to Framework Teaches the basic skills to operate the spreadsheet, graphics, database and wordprocessing. 2 days. £210.
Improve your BASIC Brushes up and improves BASIC programming technique; introduces sophisticated methods of file design, data organisation, access methods and control. Examines software tools. 2 days. £210.
Communications Introduces the techniques of communicating between micros, from micros to peripherals and from micros to mainframes. 1 day. £125.

MANAGING OFFICE AUTOMATION
A two-day seminar to prepare management to devise and implement a successful office automation strategy. It addresses key issues, presents current examples and provides the opportunity to discuss important aspects related to the needs of your organisation.
Next seminar: Mar 28-29.



Send to, or phone:
The Training Administrator, Digitus Ltd.
Lading House, 10-14 Bedford Street,
Covent Garden, London WC2E 9HE
Tel: 01-379 6968 Telex 27950 ref 3005

From

Company

Address

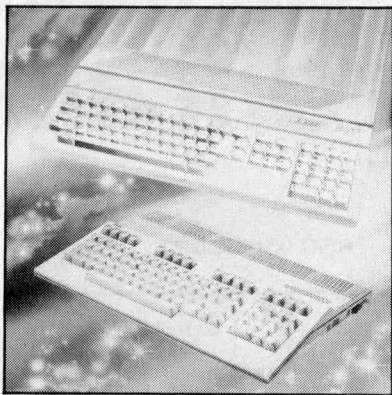
Please book places as follows ☐ or send me more details ☐

Course Date Places

IN-COMPANY TRAINING
Digitus provides courses tailored to the needs of individual companies, from seminars for management to detailed training for office and professional staff. Courses can be held on company premises, or at the Digitus Training Centre. Contact the Training Administrator for full details.

CONTENTS

Vol 8 No 3 March 1985



Cover story begins page 120
Illustration by Barry Lepard

REGULARS

- | | | | |
|---|------------|---|------------|
| NEWSPRINT | 92 | BIBLIOFILE | 194 |
| Who finds out about financial manoeuvres within IBM? Guy Kewney goes behind the scenes again this month. | | David Taylor masters Symphony as he reviews the latest books. | |
| YANKEE DOODLES | 108 | TJ'S WORKSHOP | 196 |
| Attempts to standardise operating systems on portable machines head our round-up of the action in America. | | Hints and tips to help you make the most of your micro. | |
| ORIENT EXPRESS | 110 | COMPUTER ANSWERS | 198 |
| Our Japanese correspondent unravels the mysteries of the East, including a slimline, APL-dedicated machine. | | Keep your questions coming — Simon Goodwin has the answers. | |
| LETTERS | 115 | NETWORKS | 202 |
| Putting the record straight, courtesy of our readers and Bludners. | | All the UK bulletin board numbers — and how to reach them. | |
| | | SUBSET | 204 |
| | | Machine code marvels documented. | |
| | | SUBSCRIPTIONS | 208 |
| | | TRANSACTION FILE | 209 |
| | | Second-hand bargains on offer. | |
| | | WRITING FOR PCW | 210 |
| | | Your chance to contribute. | |
| | | DIARY DATA | 210 |
| | | The dates to note in your diary. | |
| | | LEISURE LINES | 210 |
| | | Brain-teasers courtesy of JJ Clessa. | |
| | | NUMBERS COUNT | 211 |
| | | Mathematical mind-benders from Mike Mudge. | |
| | | MICROCHESS | 211 |
| | | ACC NEWS | 213 |
| | | PROGRAM FILE | 214 |
| | | Nick Walker presents his pick of the programs. | |
| | | BACK ISSUES | 238 |
| | | ADVERTISERS' INDEX | 303 |
| | | CHIPCHAT | 304 |
| | | Behind the curtains <i>chez</i> Sinclair and Curry. | |



- | | |
|---|------------|
| BANKS' STATEMENT | 118 |
| What next from Japan? Martin Banks admits to being puzzled. | |
| SCREENPLAY | 192 |
| The Macintosh makes its games debut, plus the best of the rest for home machines. | |

Founder Angelo Zgorelec Editor Graham Cunningham Production Editor Ginny Conran Sub Editor Lauraine Danker Home Computing Editor Tony Hetherington Business Computing Editor Peter Bright Staff Writer Nick Walker Consultant Editors David Tebbutt, Dick Pountain Editorial Secretary Tracy Dear Art Director Peter Green Assistant Art Editor Paul Ballard Typesetters Meadway Graphics 198 Victoria Road Romford Essex Sales Director John Cade Publisher Tony Harris Publishing Assistant David Mankin Group Advertisement Manager Duncan Brown Advertisement Manager Bettina Williams Assistant Advertisement Manager Claire Rowbottom Sales Executives Janette Pitt, Claire Barnes, Steve Corrick, Tony Keefe, Christian McCarthy, Anita Stokes, Isabel Blackman Advertisement Assistant Julia Vale Advertisement Production Jeska Harrington Production Assistant Bev Grice

BENCHTESTS & REVIEWS

STAR WARS

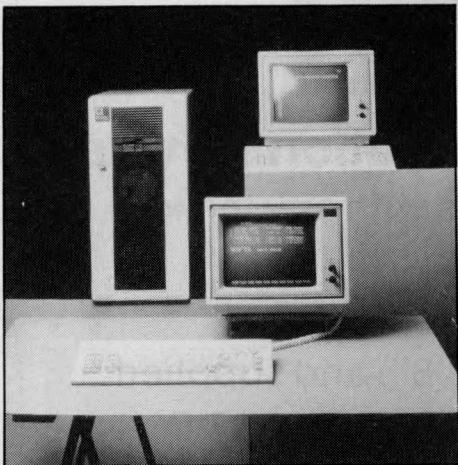
120

Sneak previews of the up-and-coming machines from Atari and Commodore — a Mac-like micro for under £500, a lap-held and a PC compatible. What more could you ask for?

ENTREPRENEUR

124

A strong contender for the title of best business package on a home machine. Peter Bright sees if Entrepreneur can really solve all your business problems.



NORTH STAR DIMENSION

128

IBM PC clones are arriving by the dozen, but multi-user systems are a rarer breed, with the promise of extra facilities and a cheaper cost per user. Martin Banks fills his office with terminals and sends himself electronic mail messages.



SHARP PC-1350 VERSUS CASIO FX-820P

136

Pocket computers are being unduly neglected. Nick Walker puts two of the best through their paces.

RGB MONITORS

144

TV manufacturers are catching on to the micro market by offering television sets that can take video signals direct. Gareth Jefferson tunes in.

COMPLETE MANAGER

180

A database package that comes in four flavours — from a menu-driven system to full applications development. Kathy Lang finds out if it lives up to its name.

OFFICE PRACTICE

188

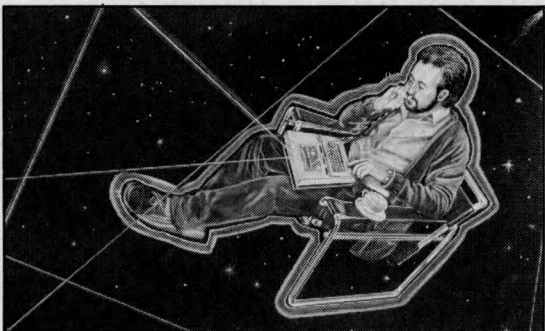
Desktop organisers that remove the clutter of diaries, address books and calculators from your desk are the latest trend in integrated packages. Mike Liardet tidies up.

FEATURES

DOWN TO BASICS

148

Despite its reputation, Basic can be used for writing efficient business programs. John Locke explains how.



SPREADING THE WORD

152

Messaging facilities play an important part in the concept of portability. Menno Aartsen looks at the electronic mail systems available.

PERFECT POWER

156

John Vogler explains how to make the most of the Perfect suite of programs.

IT TAKES ALL SORTS . . .

162

Improve your SEARCHing and SORTing techniques, courtesy of Donald Knuth and Mike Liardet.

FUNCTIONAL C

166

Les Hampson continues this Teach Yourself series with a description of functions in the C language.

TRUNDLE ALONG

172

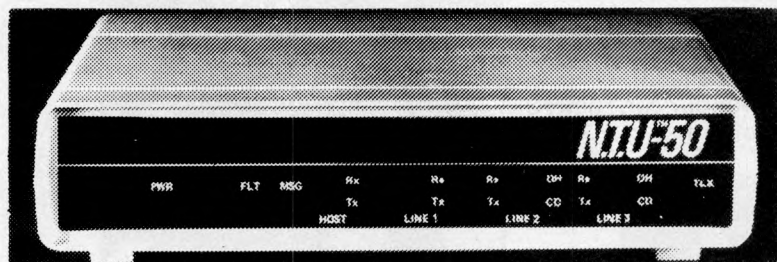
In cooperation with *Channel 4*, PCW is proud to present the Trundle, a ZX-81-based buggy which you can build yourself.

LIGHT FANTASTIC

184

The second of this month's projects allows you to download software from the TV. Take your seats for *Channel 4's 4 Computer Buffs* now.

ALFA GAT PRESENTS: New Leaders for 1985

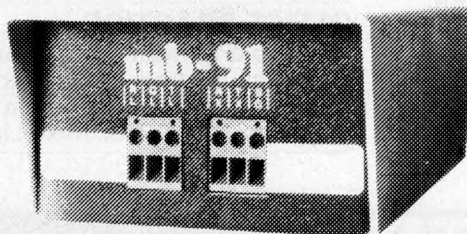


NTU 50 — Multitasking Communication Device

Together with a computer or terminal it talks with any telex, computer or data bank in the world.

This is a most versatile and cost/effective unit of its kind.

Measuring only 54 x 260 x 250 mm (2 x 10 x 9.8") and supplied with up to 3 ports. The unit is protocolised with: telex, DDD, TWX, RCA, WUTWX, SITA and more.



MB 91 — Short Distance Modem with Lightning Protection

This is an Asynchronous — short distance hauling — limited modem converting RS232C DATA for transmission over a one pair of transmission line.

It adjusts automatically to pulse widths from 50-19,200 BPS.

Its range is 10-10.000 meters (6ft to 6 miles)

and measures 20 x 9.2 x 5.9 mm (77/8 x 25/16 x 35/8").

For further details please contact:

ALFA GAT LTD.

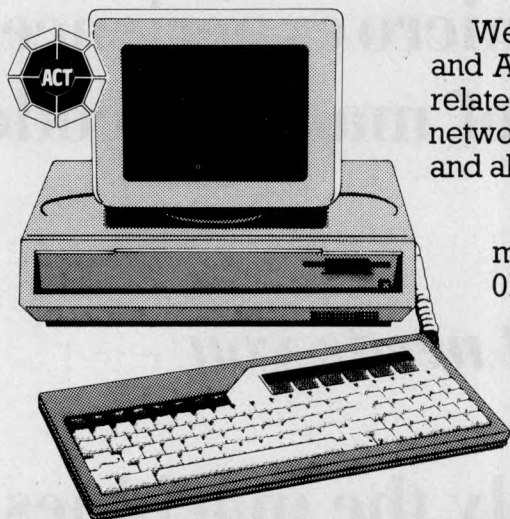
P.O.Box 23142 Tel Aviv (61231) ISRAEL. Tlx: 342349

Dealer & OEM enquiries are welcomed.

IBM+ACT WITH EXTRAS

Now
available
for Rental

- * Analysis of your requirements
- * Highly competitive pricing
- * Wide range of compatible software
- * Staff training facility
- * Rentals service available
- * Try before you buy – we refund 95% of your rental if you purchase within first month of rental
- * Trade-in on existing systems
- * Expert installation service
- * Micro data-transfer service



We specialise in networking your IBM PC's and Apricots together using the manufacturers' related products. These include IBM networking and clustering hardware and software and also the Point 7 and Point 32 from ACT.

As well as hardware from the leading manufacturers, you'll get friendly help and advice from 01 Computers, one of Britain's acknowledged experts.

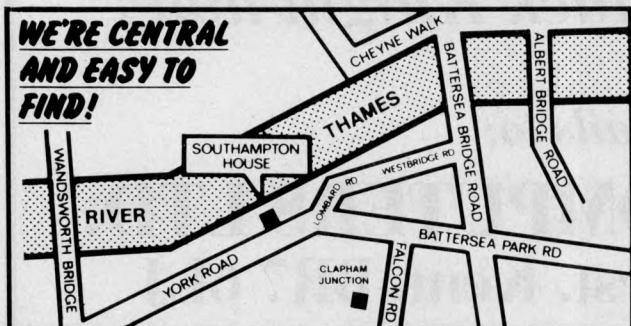
And since we also handle the New Innovative Smart Integrated Business software package, we can really help you turn your personal computer into a powerful business tool.

Send in the coupon and find out how.

01 COMPUTERS LTD.

Southampton House, 192-206 York Road, London SW11 3SA

Telephone for a FREE demonstration Tel:- 01-228 2207 Telex 8954575 CTC LDN



Fill in this coupon and send it to us at the address below.
It's an important first step to answering all your business computing needs.

Name _____

Address _____

Tel No: _____

Occupation _____

PCW/2/85

Southampton House, 192-206 York Road, London SW11 3SA

**NEW GAME FOR THE AMSTRAD
TIME BOMB**

£7.65 including VAT + P&P

NEW GAME FOR THE SPECTRUM (16K & 48K)

SPECTRABUG

£5.35 including VAT + P&P

PROGRAMMERS

The Black Knight wants you

**If you have any type of micro experience,
especially in the field of machine code
programming**

The Black Knight needs you

**In return, we will supply the machines,
project ideas and substantial royalties**

So why not join the Black Knight now!

Send full details to:

BLACK KNIGHT COMPUTERS LTD.

PO Box 132, Chislehurst, Kent, BR7 6LJ

MicroSight



MicroSight I on the BBC model B includes:—

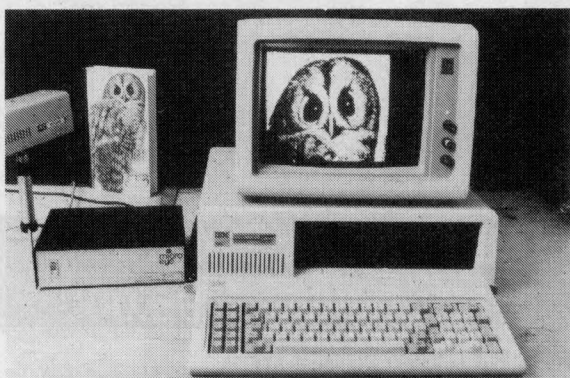
- A CCTV camera with lens and tripod.
- MicroEye vision interface 256 x 300 resolution with 8 bit video plus all cables.
- Fully documented hardware and software.
- MicroSight software package with area perimeter routines as well as disk and printer dumps.
- Hi Res software package with mode O display, disk and printer dumps and thresholding.
- Package using mode 2 high quality display.

MicroScale

An image processing package with editing area and perimeter calculations, dimensioning, windowing, threshold and contrast setting.

MicroEye

Vision interface 256 x 300 resolution 256 grey levels with full documentation and software for BBC Sirius, IBM, Apple, RML, CBM etc.



MicroScale II

Image analysis for the IBM PC with:—

- Object area measurement (absolute and %)
- Perimeter measurement to user defined scaling
- User definable and standard windows.
- Disk and printer dumps.
- Dimensioning and object counting.
- Fully documented C software.

Also available for Hewlett Packard and Sirius.

For further details contact:—

DIGITHURST The image analysis people

Digithurst Ltd.

Leaden Hill, Orwell, Royston,
Herts. SG8 5QH

Telephone (0223) 208926

ATT

01-729 7033

(T.I.) Industrial Unit,
Stanway Street,
London N1 6RY

Telex: 296119 DATALX G

4% EXTRA DISCOUNT WHEN BUYING 2 OR MORE!

WE'LL BEAT ANY PRICE BY

£10

If proof of a written quotation from an authorised dealer is provided

**AND THANK YOU
FOR THE PRIVILEGE**

COMPUTERS • SOFTWARE • PRINTERS

APRICOT

F1 256K	945
PC 2X 315K	1308
PC 2X 720K	1472
Portable 256K	1472
Portable 512K	1882
Xi 10MB	2292
Point 32 10MB	2456
MSD 10MB	1062
9" MON	164
12" MON	205
10" Colour Mon	324
Mouse cordless	78
128K Board	165
256K Board	324
512K Board	652
Modem Board	242
Printer 08	136

IBM P.C.

PC 64 1X360K	934
Portable 2X360K	1648
PCXT 10MB	2318
PC 64 10MB	1750
Portable 10MB	2230
PC AT/ATE	Call
360K Drive	243
PC Keyboard	151
AT Keyboard	Call
Mono display	153
Mono/Printer adap.	148
RGB Colour Mon	405
Colour adap.	159
Parallel adap.	71
64K RAM kit	59
10MB upgrade kit	820
DOS 2-1	48

APPLE

MAC 128K	1472
MAC 512K	2128
MAC Drive	286
IMAGE WRITER 10"	316
IMAGE WRITER 15"	430
ACC kit	31
APPLE //e	481
//e & Duo Disk & MON //e	898
Mouse //e	111
APPLE //C	709
//c Drive	188
MON & stand //c	137
Mouse //c	58

SOFTWARE

Lotus 123	262
Symphony	399
D Base II	230
D Base III	339
Framework	335
Wordstar	190
Wordstar Prof.	285
Multimate	220
Supercalc 3	210
Multiplan	130
Sage accounts	249
Pegasus	185
JAZZ	Call
Apple Works	140
File Vision	140

COMPAQ

PC 2X360K	1799
PLUS	3235
PC 10MB kit	2395
Deskpro Mod 2	2128
Deskpro Mod 4	4588
30 MB Drive	Call

PRINTERS

Too many printers to list
— call for best price

01-729 7033

EXPORT ENQUIRIES WELCOME

We accept official orders from UK Government and Educational Establishments. Mail Order and Export Enquiries welcome. Callers by appointment.

All prices exclude VAT

CREDIT CARDS ACCEPTED

SINCLAIR
ORIC, COMMODORE
ACORN, MEMOTECH, ETC

MICRO

We export Microcomputers
and Peripherals to all Countries
Any make. Any Quantities
BIG DISCOUNTS

send for comprehensive price list to:
Dept T

MICRO-X LTD

765-767 HARROW ROAD, LONDON NW10 5NY
TELEPHONE 01-968 6622 TELEX 915866 MICROX G.

EXPORT

Have you put a **CLIP** in your Winchester?

CLIP — Compressed Library Interchange Program

CP/M

CP/M-86

PC DOS

MS DOS

£95.00

- **Backs up a Winchester on to floppies.**
- **Compresses text or data to less than half size.**
- **Large files can span multiple discs.**
- **Selective backup or retrieval, on an inclusive or exclusive basis.**

CLIP has no equal in reputation, convenience, power or economy.

EFFORTLESS BACKUP

You can save commands for later use, or type commands directly.

CLIP has its own menu, with seven prepared commands. Customise the commands if you wish, or edit the menu text with a word processor. Or keep the standard forms. All your housekeeping — save/restore/review — by pressing two keys.

CLIP comes standard with Winchester systems supplied by
British Telecom, Olympia, SCifer Systems, Research Machines and Philips.
And is highly recommended by other major manufacturers



KEELE CODES LTD

University of Keele, Keele, Staffordshire, U.K. Tel: (0782) 629221 Telex: 36113

All prices excl. VAT, post free in U.K.
Most popular disc formats from stock.

"Significantly faster and more powerful than the IBM PC"

PRACTICAL COMPUTING

You can choose the right micro in just a few seconds.

But don't take our word for it.

"Its flexibility leaves the IBM PC for dead"

PERSONAL COMPUTER NEWS

"You wonder why you put up with the IBM for so long"

PERSONAL COMPUTER WORLD



Tasha
Business Systems

TURN TO PAGE 13

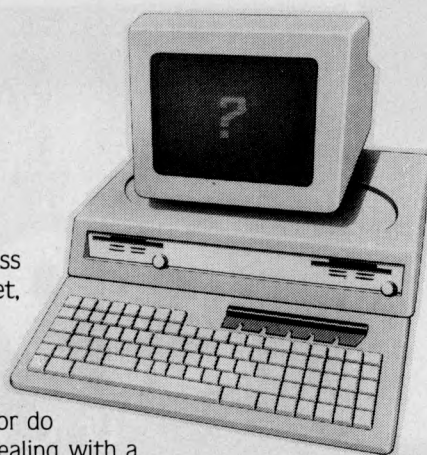
191 Kensington High Street,
London W8

Phone: 01-937 8529
01-937 3366

Telex: 946240 (CWEASY G)
MBX No. 19001120

olivetti

**What's
good for
our dealers
is good
for you.**



When we decided to address the business computer market, we found a dilemma.

Do customers want the accessibility and accountability of a local independent dealer, or do they want the confidence of dealing with a substantial public company?

The answer: Both.

The result: SBC.

SBC is a network of professional independent dealers individually vetted against stringent criteria, with the backing of a £30 million turnover organisation

Everything we give to our dealers enhances their service to you, from competitive products and prices, to exceptional leasing and maintenance deals.

We have taken some of the best dealers and given them more. So what's good for our dealers is good for you.

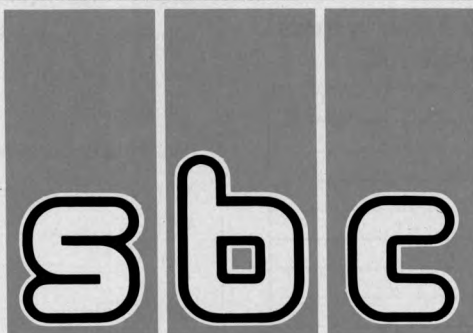
For the best of both worlds in business micros, contact your nearest SBC dealer or complete the coupon now!

Adelphi Business Computers Ltd	Central Computers	Mipac Services	Oxford Data Systems	Pilot Software Ltd.	Spectrum Business Centre	SBC (Humberside) Ltd	Syntax Business Computers	Unique Solutions Ltd.
25 Trinity Street, Coventry, West Midlands CV1 1FJ Tel: (0203) 553944	35 Churchill Precinct, Dudley, West Midlands DY2 7BL Tel: (0384) 238169	63 King St., Lancaster Tel: (0524) 62033	29 Pound Way, Cowley Centre, Oxford OX4 3XX Tel: (0865) 717720	32 Rathbone Place, London W1P 1AD Tel: 01-636-2666	Hunting Gate, Hitchin, Herts. SG4 0TJ Tel: (0462) 37171	56/58 Anlaby Road, Hull, Humberside HU1 2PA Tel: (0482) 24346	Armada House, 170 Armada Way, Plymouth, Devon PL1 1LB Tel: (0752) 23190	17-21 Castle St., Cardiff CF1 2BT Tel: (0222) 390714

DEALERS

If you're a business micro dealer and would like to know more about SBC, ring Nick Ray or Andrew Doxsey on Hitchin

(0462) 37171



SPECTRUM BUSINESS CENTRES

(A division of Spectrum Group PLC)

Hunting Gate, Hitchin, Hertfordshire SG4 0TJ
Tel: Hitchin (0462) 37171

Please clip this coupon and send to: (No stamp required)
FREEPOST SBC, HITCHIN, HERTS, SG4 0YA

Name

Position

Co. Name

Address

..... Tel.

MONITOR THE REDUCTION ON OUR HIGH RESOLUTION.



We've reduced the price of our RGB high resolution colour monitor (580 x 470 pixels) to only £199.95 – that means you save £50 on our previous offer – and that includes VAT, leads and carriage.

And just because you're saving on price doesn't mean you're sacrificing quality. Here's what Acorn User had to say about our monitors.

“..Gave steadier pictures than the Microvitec Club, and the colours were rather better.

It seems that all ‘normal’ and ‘medium’ resolution monitors, including the Sanyo, are simply inadequate to deal with the Beeb’s graphics and text output.

The JVC was excellent, giving clear, legible results.

Was the JVC better than the Microvitec?*
Would I buy one? Yes to both questions?”

MODEL REFERENCE	1302.2 High Resolution
RESOLUTION	580x470 Pixels
C.R.T.	14"
SUPPLY	220-240v, 50-60Hz.
E.H.T.	Minimum 19.5kv Maximum 22.5kv
VIDEO BAND WIDTH	10MHz.
DISPLAY	80 characters by 25 lines
SLOT PITCH	0.41mm
INPUT: VIDEO	R.G.B. Analogue TTL Input
SYNC	Separate Sync on R.G.B. Positive or Negative
EXTERNAL CONTROLS	On/off switch and brightness control

The unit has a 14" screen and is suitable for the BBC Micro, Electron, Sinclair QL, Lynx, Oric, Apple, IBM, Amstrad and RML 480Z and most other leading micros.

And there's a year full guarantee.

If you order your monitor by post, you'll receive it within 48 hours by courier service.

Simply post the coupon below to: Opus Supplies Ltd., 158 Camberwell Road, London SE5 0EE. Or by telephoning 01-701 8668 quoting your credit card number. Or, of course, you can buy at our showroom between 9.00–5.30pm, Monday–Friday.

*Microvitec Cub 14" Monitor.

To: Opus Supplies Ltd., 158 Camberwell Road, London SE5 0EE.

Please send me: _____ High Resolution Colour Monitor(s) at £199.95 (inc. VAT)

I enclose a cheque for £_____ Or please debit my credit card account with the amount of £_____ My Access/Barclaycard (please tick) no. is _____

Please state the name of your computer _____

Name _____

Address _____

Postcode _____

Telephone _____

Opus.
Opus Supplies Ltd.

More Great Price Drops!

OLIVETTI PC

M24: dual 320kb disk drive; 128kb RAM, keyboard monitor and MS DOS.....**£1,545**

M24: 10Mb Integral hard disk, 1x320kb disk drive, 128k RAM, keyboard, monitor and MS DOS **£2,999**

PORTABLE COMPUTER

M21: dual 320kb disk drive monitor.....**£1,699**

HITACHI PC

HITACHI PC: dual 320kb floppies 128kb RAM; keyboard; colour monitor, nucleus generator, MS DOS **£1,295**

HITACHI PC: dual 320kb floppies 128kb RAM; keyboard; colour monitor; 10Mb hard disc; nucleus generator, MS DOS, purchase ledger, sales ledger, nominal ledger, payroll order processing, microopen, all for only.....**£2,495**
128k RAM memory board.....**£180**

HEWLETT PACKARD

HP-150: dual 270kb 3½" disc drive 256kb RAM, keyboard, High resolution (512x390) monitor.....**£1,999**

HP-150: dual 720kb 3½" disc drive 256kb RAM, keyboard, High resolution (512x390) monitor **£call**

HP-150: 15Mb hard disk, 1x720 kb disk drive; 256kb RAM; keyboard, High resolution monitor **£call**

WORDSTAR
LOTUS 1-2-3
MULTIPLAN
DELTA 2

WORDCRAFT
MEMOMAKER
VISCALC
PEAGUSUS

ACCOUNTANCY

HEWLETT PACKARD HP110

The Portable HP 110: 272kb RAM 384k ROM, 16 lines by 80 col LCD Lotus 1-2-3 Memomaker **£2,199**
Thinkjet Printer: portable.....**£399**
Portable disc drive 720k.....**£call**

HEWLETT PACKARD CALCULATORS

HP 11C..... £54	HP 12C..... £94
HP 15C..... £94	HP 16C..... £94
HP 75C..... £599	HP 71B..... £call
Visual pack..... £119	Data Com Pac..... £144
Text Formatter..... £78	
HP 41C..... £129	HP 41CV..... £149
HP 41CV..... £149	HP 41CX..... £221
Card Reader..... £145	
Printer..... £call	
Cassette Drive..... £call	

IBM SOFTWARE

WordStar Prof pack..... £299
Lotus 1-2-3..... £349
Symphony..... £399
Framework..... £call
Wordcraft..... £call
Sage Accounts..... £call
Pegasus Accounts..... £call

MACINTOSH

Macintosh 128kb RAM..... £1,549
Macintosh 512kb RAM..... £call
External disk drive..... £349
Image Writer Printer 10"..... £385
Image Writer Printer 15"..... £call

Multiplan..... £179	TK Solver..... £189
Chart..... £139	Word..... £179
Basic..... £139	OMNIS1..... £149
Lotus Jazz..... £call	OMNIS2..... £295
Copy-Mac..... £39	OMNIS3..... £399
MacPlot..... £99	PFS: FILE..... £call
	DFS: REPORT..... £call
	Macforth..... £call
Clickart..... £call	MacPascal..... £99
Mac the knife..... £call	MacProject..... £99
Millionaire..... £call	Macterminal..... £call
Zork I..... £call	Macdraw..... £call
Zork II..... £call	Deadline..... £call
Zork III..... £call	
Witness..... £call	

Hitchhiker's Guide to Galaxy..... £34	MacCalender..... £call
Music Composer..... £69	Trivia..... £34
Frogger..... £34	Funpack..... £34
Lode Runner..... £call	Penstate..... £call
MacGammon..... £call	Payroll..... £call
Sargon III..... £42	

APPLE CREDIT CARD

£1,500 INSTANT CREDIT AVAILABLE

Subject to
acceptance **APR. 29.8%**

APPLE IIC PACKAGE

Apple IIC
Monitor IIC
Monitor Stand IIC
£949

APPLE IIe PACKAGE

Apple IIe 64k disk drive with
controller
£699

EX-DEMO APPLE II

Silentye Printer III..... £99
Apple Business Basic III..... £49
VisiCalc III..... £89
Apple Writer III..... £99
Mail List Manager..... £50

ENTERTAINMENT FOR IBM & HEWLETT PACKARD

We carry a large range of games for
IBM PC

**ADVENTURE
BUSINESS
STRATEGY**

EPSON HX-20

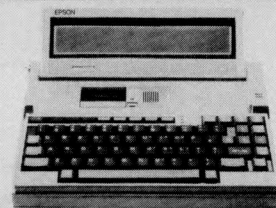


£398

FREE **INTEXT WORD PROCESSOR**

EPSON HX20 EXECUTIVE

EPSON PX-8



FREE **WORDSTAR SPREAD SHEET**
£795

LETTER QUALITY PRINTERS

SILVER REED	
EXP 500 Parallel/Serial.....	£270/310
EXP 550 Parallel/Serial.....	£360/399

BROTHER	
HR-15 13cps (Diablo).....	£389
HR-35 36cps (Diablo).....	£call
Lazerjet Printer 300 cps.....	£3,195

DOT MATRIX PRINTERS

Canon PW 1080A.....	£289
(160cps) 27cps NLQ.....	£call
EPSON JX80 colour printer.....	£200
LQ 1500.....	£239
RX80 FT.....	£400

FX80.....	£call
FX100.....	£call

HEWLETT PACKARD
Thinkjet Printer (150cps).....**£399**

GRAPHIC PLOTTER

HP 7470A.....	£1,099
HP 7475A.....	£1,637
Epson Plotter.....	£399
Apple Plotter.....	£399

MSX COMPUTERS

SONY	
HIT BIT 64k RAM.....	£260
Disk drive.....	£299

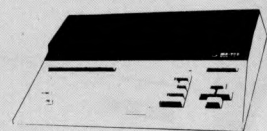
SANYO	
MPC 100 64k RAM.....	£260
Joysticks (two Ports).....	£call
Light pen.....	£call

JVC	
HC-7GB 64k RAM.....	£call

PANASONIC

SHARP MZ 700

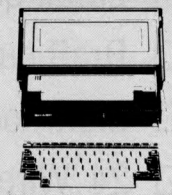
The personal computer you need now and in the future



MX 700 64kb RAM

£99

EX-DEMO SHARP PC5000



128kb Ram; 64kb Rom, 128 Bubble memory
Printer
Super Writer
Super Calc
Super con disk
M.R.P. **£2,224** **£1,699**

COMMODORE

Commodore 64.....	£161
MSP801 Printer.....	£174
C2N Cassette.....	£39
Plus 4 Computer.....	£244
C2N Cassette.....	£39

ORDERS ONLY

Tel: 01-937 3366 ext 12
01-937 8529

Tasha Business Systems
191 Kensington High Street
London W8

● TBS reserves the right to change advertised price
● Add 15% VAT
● Goods subject to availability

Tasha Tasha Tasha

Business Systems Business Systems Business Systems

191, Kensington High Street, London W8. Tel: 01-937 3366



The unbelievably believable TOSHIBA 1351 is!

- | | |
|--|--|
| ☐ Letter quality at 100 cps | ☐ Range of paper handling options |
| ☐ Draft quality at 192 cps | ☐ Serial or parallel interfaces |
| ☐ Multi-font capability | ☐ Downloadable font versions |
| ☐ 24 Wire Head | |

No further need to buy two Printers when for the price of one you have high speed word processing, high resolution graphics and a high speed draft printer.

★ SPECIAL FONTS AVAILABLE FOR SCIENTIFIC WORD PROCESSING, CHEMICAL SYMBOLS AND ARABIC LANGUAGE.

Printer Professionals



**THAME SYSTEMS LTD.
PERIPHERALS DIVISION**

THAME, OXON OX9 3XD TELEPHONE: 084 421 5471 TELEX: 837508

A Member of the Memec (Memory and Electronic Components) PLC Group

NORTHERN OFFICE: WARRINGTON (0925) 825065

I don't believe the TOSHIBA 1351 is that good!
Please send print sample.

NAME: _____

COMPANY: _____

ADDRESS: _____

Postcode _____

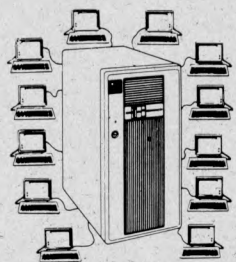
Phone No. _____

LONDON COMPUTER CENTRE IBM PC, XT, Portable

NorthStar 

—the pioneers in S100 Horizon
Computers since 1976 proudly
present **DIMENSION**

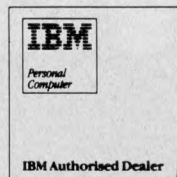
The IBM compatible **Multi-user** system (up to 12 users)
15Mb hard disk and 2 user stations
complete with VDU running IBM graphics **£5,875***



Each subsequent work station
(8088 CPU 128K RAM) is complete with
Keyboard, Monitor and Cables **£1,395**

*including 6 months on-site warranty,

*Networking
*Software
*Add-on boards
*In stock
Telephone for prices.



DOT MATRIX PRINTERS

CANON 80 Col 160cps	£299
CANON 156 Col 160cps	£399
EPSON FX80/FX100 160cps	phone
EPSON LQ 1500 Par/Se	£980
Fujitsu DPL 24 240 CPS	£1,495

DAISYWHEEL PRINTERS

FLOWITER 1600 60cps	£1,600
TEC F10 40cps	£1,050
TEC F1500 25cps	£395
JUKI 18cps	£399
Fujitsu SP320 48cps	£980

SHEET FEEDERS

BDT 2 Tray Auto	£595
BDT 3 Tray Auto	£695
BDT Single	£375
Juki Sheet Feeder	£239
Juki Tractor Feeder	£99
Tractors (Qume RICOH, Tec)	£139

PORTABLES

Compaq IBM Compat	from £2,195
Chameleon IBM Compatible	£1,595
16 bit/8 bit Free Software Worth	£1,000

LAP PORTABLES

NEC 8201 16K	£299
EPSON HX20 16K	from £402
TANDY 100 8K	£350
EPSON PX8	£798

SOFTWARE 8/16 Bit

Please phone for LCC Catalogue covering:
Word Processing; Accounting, Financial Planning,
Integrated Software, inc. Graphics, Database,
Languages, Communications.

FORMATS: Superbrain, Televideo, Sirius, Sanyo
Northstar 8" SD, DEC, Epson QX-10, IBM
ICL, H-P, XEROX, ALTOS, Apricot, NEC-APC
All prices are exclusive of VAT

NEW! apricot F1

True 16 bit inc. ACT Sketch, ACT Diary
Tutorial - SuperPlanner, SuperCalc,
SuperWriter - Software.

LCC SPECIAL BUNDLE

Apricot F1	£1,095.00
Monitor	200.00
Printer Dot/Daisy	290.00
Cables	25.00
Disks	55.00
Paper	15.00

£1,680.00
285.00

LCC SAVING

YOU PAY

£1,395.00
£895

apricot F1E

315K single sided Sony 3.5
CP/M, Personal Basic, Dr. Logo

apricot Portable

from **£1,695**
256K Ram, 720 Disk Drive LSD Display
Bundled Software as F 1

apricot PC

Twin S/S Disks 256K **£1,595**
Twin D/S Disks 256K **£1,795**

apricot k

256K Ram 10Mb Hard Disk **£2,545**



olivetti M24

Compatible & faster than IBM PC
2 Drive System 128K **£1,939**
10Mb Hard Disk (XT) **£3,363**
*Built-in Graphics & Colour
*Runs Flight Simulator, Lotus 1-2-3 on
mono or colour
*7 IBM slots
*8 Mhz 8086 true 16 bit

HARD DISKS

Hard Disks for IBM PC Sirius QX10, NEC	
10 Mb	£1,295
15 Mb	£1,445
20 Mb	£1,545
10 Mb Tape Streamer IBM PC	£895

PLOTTERS

Hewlett-Packard 74754A 6 Pen	£1,560
Roland DXy 880 8 Pen Plotter	
100% HP 7475 compatible	£660.00

MODEMS/MONITORS

Buzz Box, Direct Connect Modem	£70
EPSON Acoustic Coupler CX/21	£160
Minor Miracle's W2000 Modem	£130
Roland 14" RGB Hi Res for IBM	£375

ACCESSORIES

Floppy Disks	Printer Buffers
Daisywheels	Paper
Ribbons	Labels
Cables	Computer cleaning kits
Disk containers	Acoustic Hoods



**SANYO
IBM
COMPATIBLE
16 bit**
* runs most
non-graphic
software

8088 CPU, 128K RAM (expandable to 256K) MSDOS	
550 1 Drive 160K	£749
*550/160 2 Drives 160K ea	£775
555 2 Drives 160K ea	£999
550/800 2 Drives 800K ea	£1,085.00
555/800 2 Drives 800K ea	£1,170.00
*LCC upgrade	
Monitor mono/ colour	£125 from £350

Dealer enquiries invited on all products.

43 Grafton Way, London W1P 5LA (Opposite Maples)

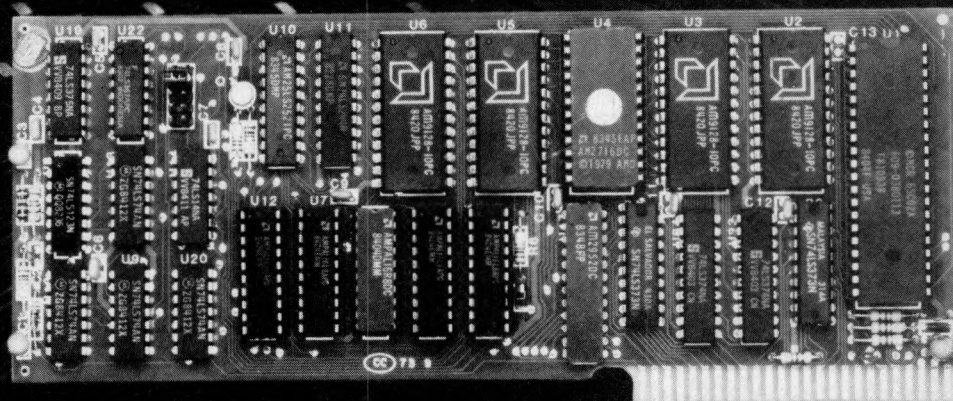
Opening Hours: 10-7 Mon-Fri. 10.30-4 Sat.

01-387 4455 (4 lines) Telephone Answering Service After Office Hours

Telex: 8953742

**DEMONSTRATIONS
SALES - SERVICE
SUPPORT**

SUPERCHARGES WITHOUT OVERCHARGING.



RUN YOUR APPLE II, II+, IIe 3½ TIMES FASTER FOR £298

Life just isn't fair. You spend good money to buy an Apple™ computer so you can be more productive, but it seems like you spend half your time waiting for the computer to finish its computing. You wait while it recalculates your VisiCalc™ spreadsheet. You wait while your word processor moves a paragraph. And if you write your own programs you can grow old waiting for compilers and assemblers to finish. At last, there is something you can do to win the waiting game. You can get a Speedemon™, the Apple speed-up card. Just open the cover, plug it into the expansion slot and PRESTO! — your Apple runs up to 3½ times faster! Yes, it works with all Apple software. Yes, it works

with all standard Apple peripheral cards. Yes, it works with whatever amount of RAM you have. It only costs £298 + VAT, far less than competing brands. How can this be? Simple. Speedemon surgically replaces the slow Apple processor with a high speed 65C02 processor and fast cache memory to execute your software internally at high speed, but still accesses Apple RAM at normal speed. Your Apple will love it. You will love it. Talk to your local Apple dealer or order direct from: Erima (UK) Limited, 3 Heliport Trading Estate, Lombard Road, London SW11 3RF. Tel: 01-228 1551 official orders or credit cards accepted.

Dealer Inquiries Invited

Apple is a registered trademark of Apple Computer Inc. VisiCalc is a registered trademark of VisiCorp. Speedemon is a registered trademark of M-c-T

Crestmatt challenge you to find a better deal.

Commodore 64 £521 + VAT
 CBM 64 professional pack
 1541 disk drive
 MPS801 printer
 EasyFile
 EasyScript word processor
 20 blank disks
 6 games on disk
 box of paper
 Intro to Basic 1

Apricot F1 £1095 + VAT
 256k business system
 1x720k double-sided d/d
FREE 9" ACT monitor
 SuperWriter w/processor
 SuperCalc spreadsheet
 SuperPlanner
 GSX graphics utility
 ACT Diary
 ACT Sketch

Apricot PC £1595 + VAT
 256k business system
 2x315k disc drive
FREE 9" ACT monitor
FREE shinwa CPA80 printer
FREE printer cable
 SuperWriter w/processor
 SuperCalc spreadsheet
 SuperPlanner
FREE 5 blank discs
FREE box of paper

ITT: XTRA £2108 + VAT
 128k business system
 (operationally compatible
 with IBM PC/XT)
 12" amber monitor
 2x360k double-sided d/d
FREE Juki 6100 daisywheel

QL pack £485 + VAT
 128k business pack
 4 software packages
 Brother HR5 printer
FREE printer cable
FREE 6 extra cartridges

Apricot PC £1795 + VAT
 256k business system
 2x720k double-sided d/d
FREE 9" Apricot monitor
FREE Epson RX80FT printer
FREE printer cable
 SuperWriter w/processor
 SuperCalc spreadsheet
 SuperPlanner
 manuals/documentation for
 MSDOS, MSBASIC plus
 standard utilities
FREE 10 blank discs
FREE box of paper

FREE printer cable
FREE WordStar Professional
 word processor includes
 SpellStar MailMerge
 StarIndex
FREE 10 blank d/s discs
FREE box of paper



authorized dealers for
Apricot, STC computers,
Pegasus, SageSoft,
CashLink, Anagram,
SAM, MicroPro &
CompSoft Software

printers

call for latest prices

Printers: dot matrix
 Commodore MPS801
 Shinwa CP80 80cps (p)
 Shinwa CPA80 100cps (p)2k
 Shinwa CPA80 100cps (s)2k
 Epson RX80FT 100cps
 Epson FX80 160cps
 Ensign 165cps 72corresp
 Kaga Texan 160cps 27nlq
 Canon PW1080 160cps 27nlq
 Canon PW1156 160cps wide
 Brother EP44
 Brother HR5 30cps
 SmithCorona D200 160cps
 SmithCorona D300 wide
 SmithCorona FASTEXT 80cps
daisywheel
 Juki 6100 20cps
 Juki 6300 40cps
 DaisyStep 2000 18cps
 Brother HR15 13cps
 Brother HR25 25cps
 Brother HR35 35cps
 SmithCorona L1000
 Commodore DPS1101 18cps

ITT XTRA
 Personal Computer.
**STC AUTHORISED
 DEALER.**



Crestmatt packages
 may be reconfigured to
 suit individual business
 needs. We provide
 demonstration,
 support and
 training with
 on-site maintenance
 contracts available.

Crestmatt Limited
 67a York Street (Baker St) 
 London W1H 1PQ
01.402 1254/5
01.723 4699

telex 265871 (MONREF G)
 quote ref81:DRG015
 export and mail order
 enquiries welcome
 Mon/Fri 9.30-7;
 Saturday 10.30-4

offers strictly one month
 prices subject to change
 without notice; goods
 subject to availability
 add VAT at 15% to all prices

GALAXY WEST ONE

BUSINESS SYSTEMS LTD

230 Tottenham Court Road, London W1P 9AE. Telephone: 01-636 7142/4102

Looking for a business system? Let us help you. Call in or phone for friendly, professional advice.



apricot WITH 10MB WINCHESTER ONLY £1995 + VAT! PLUS

- FREE Monitor
- FREE Wordprocessor (Superwriter)
- FREE Spreadsheet (Supercalc)
- FREE Super Planner

INTEGRATED ACCOUNTS PACKAGE

- FREE Invoicing
- FREE Stock Control
- FREE Sales Ledger
- FREE Purchase Ledger
- FREE Nominal Ledger
- FREE Payroll
- FREE Mailing List

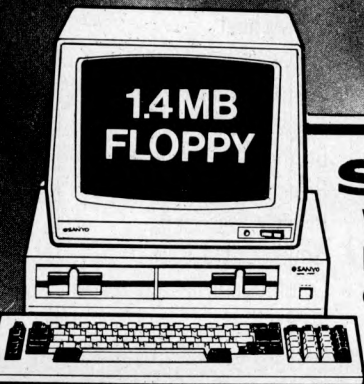
SPECIAL INTRODUCTORY OFFER

apricot PC

DUAL 315K DRIVES (630K) ONLY £1395 + VAT! PLUS

- FREE ACT 9" Monitor
- FREE Superwriter (Wordprocessor)
- FREE Supercalc (Spreadsheet)
- FREE Superplanner
- FREE CP/M 86
- FREE Concurrent CP/M 256K Memory

APRICOT PORTABLE only £1495 + VAT



SANYO MBC WITH 2x720KB FLOPPY DISC ONLY £995 + VAT! PLUS

- FREE Monitor (Philips V7001)
- FREE Wordprocessor (Wordstar)
- FREE Spreadsheet (Calcstar)
- FREE Invoicing
- FREE Stock Control
- FREE Sales Ledger
- FREE Purchase Ledger
- FREE Nominal Ledger
- FREE Payroll
- FREE Mailing List

Integrated Accounts Package

GALAXY BARGAINS

SANYO with 10MB Winchester floppy, 128K Ram, Wordstar & Calcstar and Monochrome Monitor **£1995 + VAT**

APRICOT PC: DUO 720K discs and monitor **£1595 + VAT**

APRICOT Xi5: 5MB Winchester **£1995 + VAT**

APRICOT Xi10: 10MB Winchester **£2195 + VAT**

PLUS FREE INTEGRATED ACCOUNTS PACKAGE WITH THESE SYSTEMS

TRAINING CAN BE PROVIDED ON ALL SYSTEMS SUPPLIED

We also stock a wide range of Printers, Monitors, Disc Drives and Software Packages, plus many other Computer Systems at bargain prices.

1 YEAR WARRANTY & MAINTENANCE CONTRACTS AVAILABLE

OPENING HOURS MON-SAT 9AM-6PM

MAIL ORDERS TO: West One Galaxy Business Systems Ltd, 230 Tottenham Court Road, London, W1.

Cheques payable to: West One Galaxy Business Systems Ltd



HELP FOR ADVENTURERS

Are you vexed by VALHALLA, hopeless with THE HOBBIT, flummoxed by PHILOSOPHER'S QUEST or stumped by SNOWBALL? The following books could save you many sleepless nights!

Each book provides 100% solutions and complete maps for the 4 adventures covered. The solutions are written in such a way as not to divulge the other secrets of the game.

THE ADVENTURER'S COMPANION

by Mike and Peter Gerrard £3.95

Covers THE HOBBIT, COLOSSAL CAVE ADVENTURE, ADVENTURELAND and PIRATE ADVENTURE.

THE COMMODORE 64 ADVENTURER

by Bob Chappell £3.95

Covers HEROES OF KARN, LORDS OF TIME, VODOO CASTLE and THE COUNT.

THE SPECTRUM ADVENTURER

by Mike Gerrard £3.95

Covers VALHALLA, SNOWBALL, TWIN KINGDOM VALLEY and URBAN UPSTART.

THE BBC MICRO ADVENTURER

by Bob Chappell £3.95

Covers PHILOSOPHER'S QUEST, CASTLE OF RIDDLES, VODOO CASTLE and THE COUNT.

All books supplied post free. Many other books and adventures are available for the Commodore 64, Amstrad, BBC Micro and most popular computers. Write in for a catalogue.

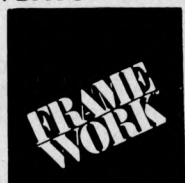


DUCKWORTH

The Old Piano Factory, 43 Gloucester Crescent, London NW1 7DY
Tel: 01-485 3484



ASHTON-TATE ■



TRAINING

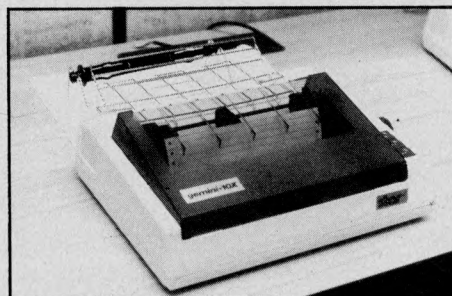
LANTECH Information Systems Ltd.
55 Peascod Street
WINDSOR
Berkshire SL4 1DE

☎ WINDSOR (07535) 58182/58013

star

ATTRACTIONS

For full listing see following page.



STAR GEMINI-10X

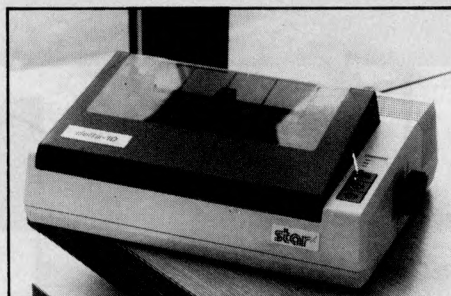
120CPS ● BI-DIRECTIONAL LOGIC SEEKING ●
FRICTION TRACTOR AND ROLL HOLDER
STANDARD ● DOWN LOADABLE CHARACTERS
● ULTRA HIGH RESOLUTION ● 80 COLS

£189.95 + VAT = £218.44

WHAT VALUE!

STAR GEMINI-15X AS ABOVE BUT 132 COLUMN

£315 + VAT = £362.25



STAR DELTA 10

QL COMPATIBLE

NO MORE TO PAY — START PRINTING TODAY

160 CPS ● BI-DIRECTIONAL LOGIC SEEKING ●
PARALLEL AND SERIAL INTERFACE STANDARD
● 8K BUFFER ● FRICTION TRACTOR AND ROLL
HOLDER STANDARD ● 80 COLS ● MANY MORE
FEATURES TOO NUMEROUS TO LIST.

£319.95 + VAT = £367.94

STAR DELTA 15 AS ABOVE BUT 132 COLUMN

£460 + VAT = £529.00



CREDIT CARD

HOT LINE

01-482 1711



PLEASE ADD £10 + VAT FOR DELIVERY. POST YOUR
CHEQUES/PO'S TO:

DATASTAR SYSTEMS UK

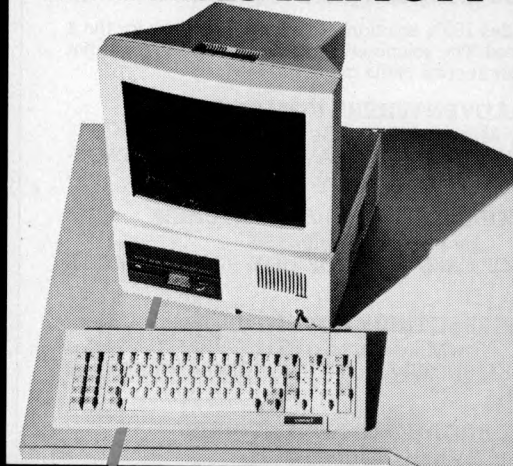
UNICOM HOUSE, 182 ROYAL COLLEGE STREET, LONDON NW1 9NN
Telex 295931 UNICOM G

PERSONAL CALLERS WELCOME

We are situated by the junction of Camden Road, near the railway bridge

Monday-Friday 9-6 Sunday 10-1

FROM A SINGLE COMART WORKSTATION



THE MIGHTY COMART SYSTEM GROWS.

Today's successful business needs more than microcomputers.

It needs the Comart system: working together, sharing information, keeping pace with your own rate of company growth and expansion.

The Comart concept is simply breathtaking... the result so proven that Comart is already the chosen system for commerce, industry and government departments throughout Britain.

And now, with the introduction of the Comart Workstation and the new CP2000 Series of Comart computers (utilising the latest Intel 80186 and 80286 Superchips) our system is powerfully fulfilled:

Both new and existing users will be able to derive the full benefits not only of a multi-user system, but of built-in Networking.

Comart's provision of Concurrent CP/M, the industry standard operating system, supports DRNET and graphics and, on the workstation, gives you access to the IBMPC software library.

Comart modularity means that even from modest single-user beginnings, you can continue to build-on power and facilities without fear of the future.

Comart flexibility means you can give each individual user precisely the system capability

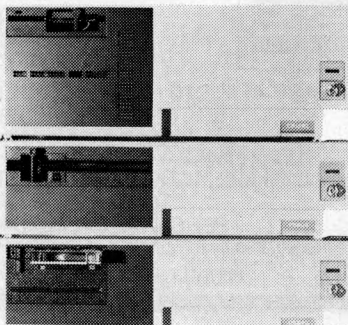
required (making us uniquely cost effective).

And Comart's deep and vital roots – nationwide – guarantee that while you'll never leave us behind, we'll never leave you in the lurch.

So don't go it alone.

Go for the Comart system.

(Complete and return the coupon and we'll send you full information on all our products – for starters – as well as the name and address of your nearest Comart dealer.)



Please send me more information on the Comart System and the name and address of my nearest Comart dealer. I am a dealer/OEM. Please send me an information pack ☐

Name _____

Company _____

Position _____

Address _____

Daytime tel. no. _____

THE COMART SYSTEM

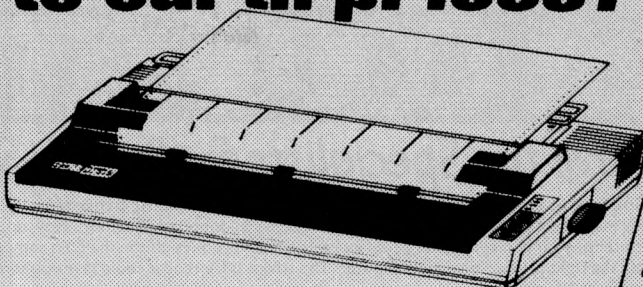
All working together.

Post to: The Comart System,
Comart Computers Limited,
Little End Road, Eaton Socon,
St. Neots, Huntingdon,
Cambridgeshire PE19 3JG.
Tel: 0480 215005

DATA STAR QUALITY

At down to earth prices.

When it comes to printers, whichever way you look at it, we've got the lowest prices, the widest range and the best back-up service in the country. What you won't get from us, are special gifts, or false promises – just honest value and a fully guaranteed after-sales service.



SPECIAL OFFERS

Brother – M1009 £173.86 + VAT = £199.95

50cps ● bi-directional ● logic seeking ● 96 chars plus international and graphics ● 9 x 9 matrix.

Gemini 10X £189.95 + VAT = £218.44

120 cps. ● bi-directional ● logic seeking ● friction, tractor and roll holder standard ● down loadable characters ● ultra high resolution ● 80 cols. ● IBM PC version available.

Kaga-Taxan KP 810 £257.00 + VAT = £295.55

Near letter quality ● 160 cps ● bi-directional ● 96 chars. plus graphics ● 5 print sizes ● 9 x 9 matrix.

COMPLETE RANGE

DOT MATRIX

Cosmos JP 80 £169.95 + VAT = £195.44

Epson RX80 £198.95 + VAT = £228.79

Epson RX80 F/T £228.95 + VAT = £263.29

Epson FX80 £319.95 + VAT = £367.94

Epson FX100 £498.95 + VAT = £573.79

Star Gemini 10x £189.95 + VAT = £218.44

Star Delta 10 £319.95 + VAT = £367.94

Star Radix 10 £498.95 + VAT = £573.79

THERMAL MATRIX PRINTERS

Brother HR5 Ring for prices

Brother EP44 Ring for prices

DAISYWHEEL PRINTERS

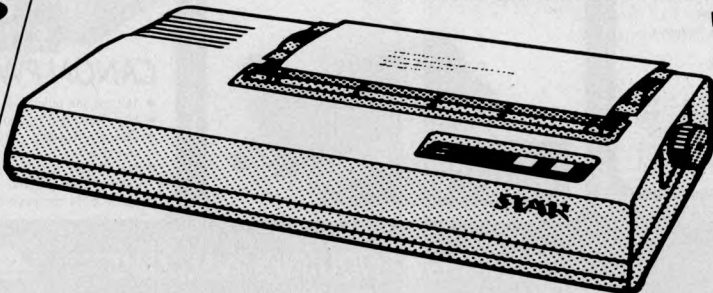
Brother HR15 Ring for prices

Juki 6100 £325 + VAT = £373.75

Cables ● Paper ● Ribbons ● Sheet and tractor feeders
● Interfaces

If you have any technical queries or want our latest prices please telephone:

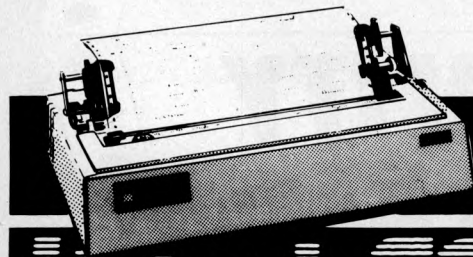
Credit card hot line... 01-482 1711



Please add £10 for delivery, we guarantee 48 hour delivery from payment. Personal callers welcome. We're at the junction of Camden Road, near the railway bridge. Anytime 9.00am to 6.00pm Monday to Friday 10.00am to 1.00pm Sunday. Export and dealer enquiries welcome. Post your order with cheque to

Datastar Systems UK

Unicom House, 182 Royal College Street, London NW1 9NN
Telex 295 931 Unicom G Telephone 01-482 1711



Which PRINTER FOR What COMPUTER?

Micro General the Specialists for Printer Selection

Contact us for our expert advice on all your interfacing problems

It's not just a question of plug in and let's go. There are now over 200 different connector situations. How do you know that your computer will accept the printer of your choice? We at Micro General do not sell boxes off the shelf. As computer engineers we help you to choose and install the right printer for your computer. The advice is free and it could save you some embarrassing mistakes - Buy from us for peace of mind.



APRICOT F1

a full blown business micro

For the first time business user a genuine business machine with some amazing 'high tech' features. - See the Apricot's mouse execute previously complex tasks at a single key stroke, and the new infra-red device means there's no cable connection to the keyboard, giving desk top planning a new meaning.

- 256K RAM 720 single disk.
- MS-DOS
- Rapid Display manipulation and special effects.
- Expansion and Outport facilities.
- Colour/Mono Monitor or VHF for your TV.
- Extremely light (under 13lbs) - totally portable.
- Price includes SuperWriter, SuperCalc, & SuperPlanner software.
- Well over 1000 software packages now available.



LEASE F1
from £6 per week
CALL FOR DETAILS
DEMO NOW

**Now in our 5th year
of business!**

IBM 34/36/38 USERS

Call for details on the
DATASOUTH TX-5180
High performance equivalent
to the IBM 5224

from £2695 + VAT.

SHINWA CPA80 MATRIX PRINTER

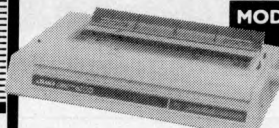
**£199
+ VAT**

Fantastic value - look at these features

- Friction and Tractor feed as standard
- 100 cps Bi-Directional Logic Seeking
- True Descenders + Sub and Superscript
- Italic Printing/Auto Underlining
- High Res. and Block Graphics

JUKI
PRINTERS/
PRINTER TYPEWRITERS

**MODELS FROM
£325
+ VAT**



- 2K BUFFER
- High reliability
- 20 cps max
- Diablo protocols.

TRY BEFORE YOU BUY!

Bring your micro to us and match with our range of printers - full workshop facilities available to iron out all technical hitches! CALL US FOR PRINT SAMPLES.

TRADE or PRIVATE CUSTOMERS take advantage of our

INTERFACING CONSULTANCY

INTERFACES & CABLES AVAILABLE FOR:

VIC 20	NEW BRAIN	COMMODORE 64	OSBORNE
PET	ORIC	TANDY	SIRIUS
SPECTRUM	DRAGON	SHARP	SAGE
SINCLAIR QL and more!			

**INTERNAL & STAND ALONE
BUFFERS from £65 + VAT**

**PRINTER SWITCHES
from £85 plus VAT.**



MICROLINE LOW COST PRINTERS



**PRICES
REDUCED**

Microline 82A	120 cps	£275 + VAT
Microline 83A	120 cps	£450 + VAT
Microline 84	200 cps	£750 + VAT
Sheet feeder	IBM version available	
for M84 £299		

In our opinion this range of printers represents the best value. From our service records we can tell that it has proved to be an extremely reliable printer. If you are looking for fast thru-put (Accounts or Data printing) check it out NOW!

- Up to 25% faster thru-put than nearest rival
- Near letter quality (92/93/84)
- Ideal printer for business systems - Statements, invoices etc.
- Multiparts - up to 6 copies.

Microline 92	160 cps	£415 + VAT
Microline 93	160 cps	£550 + VAT
The ideal alternative to EPSON FX100 - Faster thru-put and near letter quality. Recommended for IBM, SIRIUS, APRICOT		

EPSON MATRIX PRINTERS

EPSON RX80T	100 cps	£210 + VAT
EPSON RX80F/T	100 cps	£240 + VAT
EPSON FX80	160 cps	£360 + VAT
EPSON RX100	100 cps	£390 + VAT
EPSON FX100	160 cps	£499 + VAT
EPSON LQ1500	200 cps	£995 + VAT



**PRICES
REDUCED**

**HIGH SPEED
HIGH QUALITY
LOW PRICE!!**

**DUAL
MODE**



**ONLY
£319 + VAT**

CANON PW-1080A

- 160 cps and quiet too!
- High Resolution graphics
- Down loading to user-optional characters.
- Near letter quality - italic, gothic and orator fonts optional.
- Epson code compatibility.

**MICRO
GENERAL**

(PCW 3)

Unit 25, Horseshoe Park, Pangbourne, Reading, RG8 7JW Tel: 07357 4466

DEALER/OEM ENQUIRIES WELCOME
■ Always call for the best possible price.

Access/Visa

I.S.C.

Offer the UK's lowest prices on computer systems

APRICOT TWIN 315K and monitor	£1,350
APRICOT TWIN 720K and monitor	£1,500
APRICOT XI 5MB and monitor	£2,000
APRICOT XI 10MB and monitor	£2,150
APRICOT F1 720K Excl monitor	£850
COMPAQ PORTABLE	£1,870
EPSON RX80 F/T	£210
EPSON RX80 F/T	£210
EPSON FX80	£310
EPSON RX100	£330
EPSON FX100	£400
EPSON DX100	£340
WORDSTAR	£190
LOTUS 1-2-3	£250
DMS DELTA	£375
D-BASE II	£225
PEGASUS	£175

All products carry 12 months full guarantee, with **HOTLINE** phone support.

Prices exclude only VAT and delivery.

We **GUARANTEE*** the lowest prices!

I.S.C. LIMITED

GRAPHIC HOUSE, 88 WAVENEY ROAD
ST IVES, CAMBS PE17 4FW

TEL: 0480 300533

COMPANY SERVICES INCLUDE:

CUSTOMISED DATABASE SYSTEMS, MAINTENANCE CONTRACTS, INSTALLATION CONTRACTS, NETWORK SYSTEMS, MULTI-USER SYSTEMS.

FINANCING:

CASH, LEASE-RENTAL, LEASE-PURCHASE, SHORT-TERM RENTAL, HIRE-PURCHASE, PERSONAL LOANS, INSTANT CREDIT (subject to status).

** Provide a currently advertised lower price within 7 days of purchase and difference will be refunded.*

Call for IBM prices.

16 Bit Co-Processors for Z80 Systems

— from HSC, attach to any Z80 computer system — upgrade to a 16-bit system, MS-DOS 2.1 or CP/M-68K, with no programming effort. Co-processor RAM can be used as RAMDISK under CP/M-80.

CO1686 with **8086** processor (6MHz), 256 RAM, MS-DOS 2.11, RAMDISK and interface software, Z80 Interface..... **£675.00**

CO1668 with **M68000** processor (6MHz, 256K RAM, CP/M-68K (with ASMA C Compiler), RAMDISK and interface software, Z80 Interface..... **£850.00**

C Compiler-CP/M and PC/MS-DOS

C/80 Compiler from Software Toolworks — now for MS-DOS..... **£50.00**

C/80 Mathpak for floats and longs..... **£30.00**

Aztec C II for CP/M-80..... **£179.00**

ECO-C Compiler (Z80)..... **£195.00**

BDSC Compiler..... **£125.00**

LATTICE C..... **£430.00**

AZTEC C86 for MS-DOS & PC-DOS..... **£220.00**

DeSmet C Compiler MS-DOS and PC-DOS..... **£125.00**

VENIX — full Unix for PC-XT, PC-AT etc..... from **£850.00**

LISP Interpreters

LISP-80 Software Toolworks..... **£50.00**

LISP-88 from Software Toolworks (MS-DOS)..... **£50.00**

IQ LISP for MS-DOS..... **£150.00**

MU-Lisp/MU-Star..... CP/M **£175.00**..... MS-DOS **£205.00**

Forth-83 from Laboratory Microsystems

Z80 Forth..... **£89.00**

PC Forth..... **£89.00**

8086 Forth MS-DOS or CP/M-86..... **£89.00**

Software Floating Point Extension..... **£85.00**

PC Forth +, 8086 Forth+ (32 bit addresses)..... **£225.00**

Native Code Compilers..... **£225.00**

Uniform read, write and format 100 formats (inc PC-DOS) **£75.00** for

Epson QX-10, Osborne 1 DD, Kaypro, NEC, Xerox and more.

Books on C, Lisp, Forth, Pascal, 68000, 8086 available.

Prices are exclusive of VAT

Send for our catalogue — including C tools section.

System Science

6-7 West Smithfield, London EC1A 9JX

Tel: 01-248 0962

CRAZEE PRICES

ABA

ring now!

833 3831

Hardware

	List Price	1	2+
	£	£	£
IBM PC Dual Drive Mono Display (inc. k'brd)	2041	1673	1592
IBM XT Mono Display (inc. k'brd)	3439	2820	2682
Apricot F1	1095	898	854
Apricot Portable	1695	1390	1322
Apricot Double Sided + 9" Monitor	1995	1636	1556
Apricot XI 10MB + 9" Monitor	2995	2456	2336
Macintosh 128K	1795	1472	1400
Macintosh 512K	2595	2128	2024
Apple IIc	865	709	675
Compaq Dual Drive 256K	2195	1799	1712
Compaq Plus	3945	3235	3077
Datageneral 1	2490	2042	1942
Epson PX8	795	654	622

Software

Lotus 123 (for Apricot)	375	299	292
Symphony	550	451	429
Framework	495	405	386
Wordstar Professional	399	299	299
dBase II	365	299	285
dBase III	495	406	386
Filevision	159	130	124
Multimate	340	279	265
Sage	375	299	292

We accept official orders from UK Government and Educational Establishments. Mail Order and Export Enquiries welcome. Callers by appointment.

EXPORT SPECIALISTS

ABA

55 Grays Inn Road, London WC1

CREDIT CARDS ACCEPTED

All prices exclude VAT



Discounts Ranging from

5%^{to} 30%

ON ALL SALES

These are just a few sample prices

SOFTWARE

LOTUS 1-2-3.....	£300
WORDSTAR PROFESSIONAL..	£375
DBASE II	£280
MULTIMATE	£265
MULTIPLAN.....	£145
DBASE III	£325

HARDWARE

EPSON FX100 PRINTER.....	£495
MULTIFUNCTION BOARDS (FROM).....	£225
PC & XT 64K RAM (9 CHIPS)..	£42
BROTHER HR1 PRINTER	£500

SIMILAR DISCOUNTS AVAILABLE
ON IBM PC, XT, DEC RAINBOW
APPLE, LISA, MACKINTOSH
SIRIUS, APRICOT.

ALL PRICES SUBJECT TO
VAT AND DELIVERY CHARGES.

Phone 0273 204377

**Express Computer
Consultants Ltd.**



WEST NORTH EAST

DISTRIBUTOR FOR
ACORN, MICROVITEC and CUMANA
 and also dealers for many other leading manufacturers —
 please enquire for comprehensive product list
 TRADE enquiries are always welcome

BUDGET SPECIALS

8271 BBC DISK CONTROLLER
 CHIP £59.00

STOCK CLEARANCE

PASCAL-T £35.00
 FORTH £29.95
 LOGO-FORTH £35.00
 XCAL £35.00

SPECIAL PRICES FOR PERSONAL CALLERS ON ELECTRONICS etc

HCCS Associates
 533 Durham Road, Low Fell
 Gateshead, Tyne & Wear
 NE9 5EY
 Tel: (091) 4870760

Retail sales also at:
 HCCS Microcomputers
 122 Darwen Street
 Blackburn, Lancs
 Tel: (0254) 672214

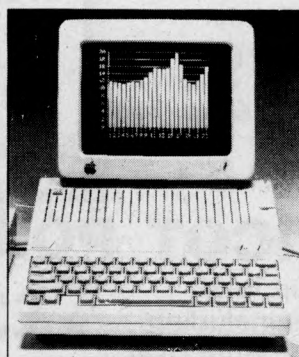
MICRO COMPUTER CONSULTANTS LTD

OUR PRICES ARE VERY
COMPETITIVE

A Challenge to
 Every businessman
MACINTOSH



ALL the APPLE range
 at BARGAIN PRICES!
 PORTABLE Luxury with the



APPLE IIC

- ★ Built-in disc drive
- ★ 128K RAM
- ★ 40/80 column display
- ★ TV Modulator
- ★ 6 interactive demo discs
- ★ Ultra Hi-Res
- ★ Built-in serial ports for printers and modem
- ★ Weight only 7.5lbs
- ★ External power supply



Authorised Dealer

Authorised Apple Dealer
Level One Service Centre

Call TODAY for further details



Ascott House, 227 Elliott St
Tyldesley, Manchester
M29 8DG

Tel: 0942-892818

☆☆☆OVERSEAS ORDERS A SPECIALITY☆☆☆



Tailored Business Systems

Complete Business Systems Tailored To Your Needs
based on Apricot, Sperry, IBM, Hewlett Packard, Sirius, Canon, Epson & Brother

• System 1 •

APRICOT XI

Hard Disk + Free Printer +
Free Integrated Accounts
Software including Payroll
Training & Installation

★ **£2995** + VAT

• System 3 •

APRICOT F1

720K Disk 256K Memory

includes Integrated Accounts Software
or Printer

★ **£1495** + VAT

• System 5 •

APRICOT TWIN DISK

+ Free Word Processor
+ Free Printer

★ **£1795** + VAT

• System 8 •

APRICOT POINT 32

with up to 32
Terminals including
Integrity Multi User
Accounting Software

From
★ **£3995** + VAT
Depending on number
of Terminals

• System 2 •

SPERRY

MODEL 40

**10 MEGABYTE
HARD DISK**

★ Free Printer ★
★ Free Integrated
Accounts Package ★

★ **£3295** + VAT

FREE

**initial TRAINING
given with each
system supplied**

• System 4 •

SPERRY

MODEL 25

COLOUR MONITOR
360K Twin Drive

★ Free
Integrated
Accounts
Package ★

★ **£2450** + VAT

• System 6 •

IBM XT

Hard Disk +
Full Integrated
Accounts Package
including Payroll
+ Free Printer

★ **£4290** + VAT

• System 7 •

APRICOT POINT 7

with up to 6
Terminals & **Integrity**
Multi User Accounts
Package

From
★ **£3995** + VAT
Depending on number
of Terminals

Authorised ACT & SPERRY Dealers

Full Maintenance available ■ Leasing Facilities arranged

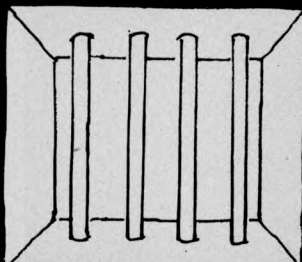


Tailored Business Systems Ltd

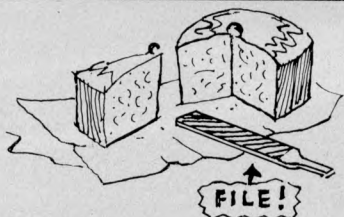
2nd Floor, Gate House, The High, Harlow, Essex CM20 1LW

CONTACT US ON... 0279 413893 (10 lines)

What use is 68000 power if you can't get at it?



You can with the U-MAN!



Look at these languages and tools available for the programmable 68000 power U-MAN Series 1000 supermicro

UCSD p-system with text editor, filer, many utilities.

- PASCAL
- FORTRAN 77
- BASIC
- Advanced Developers Tool Kit including 68000 Assembler

CP/M 68K with editor, many utilities, 68000 Assembler.

- 'C'
- CBASIC
- PASCAL MT Plus
- SVS FORTRAN
- Whitesmiths 'C'
- SVS Basic Plus
- SVS Pascal
- Cambridge LISP
- PROLOG
- FORTH
- VED 68K program editor
- XED screen editor

Where else can you get a 68000 based supermicro starting at £2500

Note that all the CP/M68K languages can use whatever RAM is installed – unlike CP/M86 and MS-DOS where the limit is usually only 64K.

for an extremely well-equipped system* expandable to 1MB RAM and Winchester?

- *192K RAM
- 68000 (10MHz) and 6809
- Dual 800K floppies
- Clock & timers
- Two serial ports
- Centronics port
- Sound generator
- Speech synthesiser
- 10 bit A/D
- 16 parallel I/O lines

Keyboard and 4 slot expansion system.



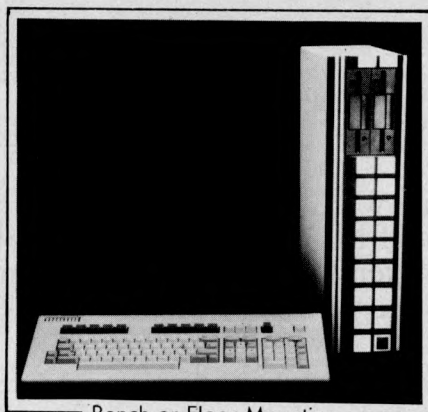
U-M LOVES HACKERS!

Although the big software houses have their parts to play we believe individuals can still make a big contribution to the software scene. If you've a program bursting to get made, needing 68000 power or U-MAN features, give us a call – we can offer up to 40% off for a bona fide project!

College or University – ask about educational discounts for Feb. & March.

Distributor, OEM and dealer enquiries welcomed.

U-Microcomputers Limited
Winstanley Industrial Estate,
Long Lane, Warrington,
Cheshire, WA2 8PR, England.
Tel: 0925 54117
Telex: 629279 UMICRO G



Bench or Floor Mounting.



U-MAN

SERIES 1000

SUPERMICRO

making it easy for programmers to make easy to use!

U-MICRO X

HI-TECH DESKS AT DOWN TO EARTH PRICES.



From £100, the Apollo business desk range will suit anyone who has a computer system, down to the ground.

They have sturdy steel underframes with scratch resistance surfaces. The top shelf has sufficient room for both monitor and printer, while the lower desk top area will accommodate your computer, hard or floppy disc drive and software.

And they all come with lockable castors and may be fitted with a lower left or right handed desk drawer for extra storage.

Generous government and education discounts are available.

To get full details of our entire Apollo range and the address of your nearest stockists, contact us on 01-701 8668 or by posting the coupon to: Opus Supplies Ltd., 158 Camberwell Road, London SE5 0EE. Opening hours: 9.00-5.30pm, Monday-Friday.

To: Opus Supplies Ltd., 158 Camberwell Road,
London SE5 0EE.

Please send details and brochure of Apollo
business desk range ☐ (Please tick)
or please send me the address of your nearest
stockists ☐ (Please tick).

Name _____

Address _____

Telephone _____

Opus.
Opus Supplies Ltd.



12 York Place
Brighton
SUSSEX BN1 4GU

Microworld

Computer and Video Centre Ltd.



10 The Boulevard
Crawley
SUSSEX RH10 1XX

**NEVER TO BE REPEATED PACKAGE DEALS
AT LOW, LOW PRICES. BEST SUPPORT, DEMONSTRATION — READ ON**

ACT APRICOTS

APRICOT F1 £1,095
★ 256K ★ 1×720K DRIVE ★
SUPERWRITER, SUPERCALC
SUPER PLANNER, SKETCH
DIARY ETC.
**FREE PRINTER OR
FREE 12" PHILLIPS MONITOR
OR
FREE ACCOUNTS PACKAGE**

APRICOT PC £1,799
★ 256K ★ 2×720K
**FREE 9" MONITOR
FREE PRINTER OR
FREE ACCOUNTS PACKAGE
FREE DISKS**
★ SUPERWRITER, SUPER-
CALC SUPER PLANNER

APRICOT PORTABLE ... £1,734
★ 256K 1×720 DRIVE
★ COLOUR CARD ★ MOUSE
★ VOICE RECOGNITION
★ FULL LCD DISPLAY

**FREE PRINTER OR
FREE ACCOUNTS PACKAGE**

SANYO

MBC
775

THE SUPERB IBM COMPATI-
BLE PORTABLE COMPUTER
★ 16 BIT/256K 8 MHz CLOCK
★ FULLY IBM COMPATIBLE
(RUNS ALL IBM SOFTWARE)
★ 2×360K DRIVES
★ MS-DOS, GW BASIC
★ 9" COLOUR MONITOR
★ 4/16 COLOUR SWITCHABLE
DISPLAY
SUPERB VALUE £2,099

**FREE PRINTER OR
FREE ACCOUNTS PACKAGE**

MBC 555 £1,124
★ 128K ★ 2×160K
★ 12" MONITOR
★ BUNDLED SOFTWARE

**FREE PRINTER OR
FREE ACCOUNTS**

SINCLAIR QL PACKAGES

PACKAGE A £599
★ 128K ★ BUSINESS SOFT-
WARE
★ 12" PRISM COLOUR
MONITOR
FREE BROTHER HR5 PRINTER

PACKAGE B £477
★ 128K ★ BUSINESS SOFT-
WARE
★ BROTHER HR5 PRINTER
★ 4 BLANK CARTRIDGES
FREE PRINTER CABLE

SINCLAIR QL £348
★ SOFTWARE
★ 4 BLANK CARTRIDGES

TATUNG EINSTIEN

PACKAGE DEAL £466
★ Z80 PROCESSOR ★ 64K
★ 500K DRIVE
PLUS FREE
★ WDPRO ★ BBC BASIC (Z80)
★ DR. LOGO ★ 6 GAMES PACK

EINSTIEN £433
★ PLUS FREE 4 3" DISKS

COLOUR MONITOR £200
GREEN MONITOR £89

AMSTRAD

CPC 464 GREEN SCREEN
★ 64K ★ Z80 £196
CPC 464 COLOUR SCREEN £292
★ PLUS £100 SOFTWARE FREE

MICROWORLD COMPUTER 4 VIDEO CENTRE LTD

12 YORK PLACE
BRIGHTON BN1 4GU

10 THE BOULEVARD
CRAWLEY, SUSSEX
RH10 1XX

ONE STOP SHOPPING

PRINTERS

TAXAN KAGA KP810
(150 CPS, 29 CPS NLQ) £259
TAXAN KAGA KP910
(15" CARRIAGE) £346
SINWA CPA80P £198
(100 CPS, F/T)
CANON PW 1080A £284
(150 CPS, 29CPS NLQ)
MANESSMANN TALLY MT80 £198

FREE EXTRA RIBBON

JUKI 6100
(20CPS DAISYWHEEL) £336
JUKI 6300
(40 CPS) £764
BROTHER HR15 £338
QUENDATA £199

MONITORS

MICROVITEC STD RESOLUTION £169
MED RES £255
HIGH RES £339
DQ3 QL (85 COL) MON £232
TAXAN KAGA K2R2 MED RES £255
KAGAN VISION QL MON £242

PHILIPS MONITOR 80
★ 20 MHz B/W, 2000 CHARACTER DISPLAY ★
SPECIAL PRICE £79

PLEASE ADD £7 P&P OR CARRIAGE
EXPORT & MAIL ORDER ENQUIRIES MOST
WELCOME



WELCOME

RING US FOR
YOUR SPECIAL REQUIREMENTS
— WE WILL DO OUR BEST

WRITE OR PHONE YOUR CONTACTS:—

DARREN BRITT, DAVE DEDYAL, GEORGE
DRURY AT BRIGHTON AND JO AT FARNHAM
PAUL KLER, BERNARD AT CRAWLEY

PHONES: BRIGHTON (0273) 671863/698241
CRAWLEY (0293) 545630 & FARNHAM (0252)
726379

PLEASE ADD 15% VAT FOR UK ORDERS

**MICROWORLD OFFERS SUPER DEALS — FREE PRINTER,
MONITOR OR ACCOUNTS PACKAGE**

BBC MICRO COMPUTER SYSTEM

BBC Computers

Model B	£348(a)	6502 Second Processor.....	£175(a)
Model B + NFS	£389(a)	Acorn IEEE Interface.....	£280(a)
Model B + DFS	£395(a)	Z80 2nd Proc. + Software.....	£348(a)
Model B + DFS + NFS	£450(a)	Bitstick + graphics Software.....	£325(a)

TORCH UNICORN PRODUCTS:

ZEP100 Z80 Card with 64K Ram + Free Software Package.....	£275(a)
ZDP240 Z80 Card as above with 2 x 400K Dual Drive + Software.....	£650(a)
HDP240 20 Mbyte Hard Disc + 400K Floppy.....	£1995(a)
HDP68K + UNIX 68000 with Z80B + 256K RAM + UNIX OS.....	£2995(a)
UNICOMM Communication Package c/w modem.....	£159(a)
GS800 GRADUATE 8086 + 256K RAM + Dual Drive + Xchange Software.....	£945(a)

In addition to above we carry a very wide range of BBC firmware & software packages. Please write for further details.

PRINTERS

EPSON

RX80FT £225(a) RX100 £345(a) FX80 £315(a) FX100 £435(a)

KAGA TAXAN NLQ Printers

KP810 £249(a) KP910 £359(a) JUKI 6100 £340(a) BROTHER HR15 £340(a)

3 Colour Graphics Plotter/Work Station £490(a)

(Includes pens, drill/router & opto sensor)

DAISY WHEELS

JUKI 6100 £340(a) BROTHER HR15 £340(a)

PRINTER ACCESSORIES

EPSON

Serial Interface: 8143 £28(b);
8148 with 2K buffer £59(b).
Buffers with large storage capacity
available from stock.
Paper Roll Holder £17(b);
FX80 tractor Attachment £37(b);
Ribbons: MX/RX/FX 80 £5(c);
MX/RX/FX 100 £10(c).
Dust Covers: RX/FX 80 £4.50(c);
RX/FX 100 £6.50(c).
KAGA Serial I/Face with 2K Buffer £65(c)
Ribbon £6(c)

JUKI Serial I/Face with 2K Buffer £60(b);
Ribbon £2.50(d).
JUKI Sheet Feeder £129(a);
Tractor Feed £129(a).
BROTHER HR15 Sheet Feeder £199(a);
Tractor Feed £99(a).
2000 Fanfold sheets with extra fine
perforations
9.5" x 11" £13.50(b); 14.5" x 11" £17.50(b).
Self Adhesive Labels 3 1/2" per 1000.
Single Row £5.25(d); Triple Row £5(d).
Parallel Leads: IBM £18(c); BBC £7(c).

PRINTER/COMPUTER SHARERS

Three Computers to one printer (parallel) £65(b) Cable Set for 3 way sharer (1m long each) £25(c)
Mains Adaptor £7(d) Two printers to one Computer (parallel) £19(c)

DRIVE ACCESSORIES

FLOPPICLENE Disc Head Cleaning Kit with 20 disposable cleaning discs ensures
continued optimum performance of the drives..... £14.50(c)
Single Disc Cable..... £6(d) Dual Disc Cable..... £8.50(c)
10 Disc Library Case..... £1.80(d) 30 Disc Storage Box..... £6(c)
30/40 Disc Lockable Box..... £14(c) 100 Disc Lockable Box..... £19(b)

EPROM PROGRAMMERS

INDUSTRIAL PROGRAMMER EP8000

This CPU controlled Emulator Programmer is a
powerful tool for both Eprom programming and
development work. EP8000 can emulate and program
all eproms up to 8K x 8 bytes, can be used as stand
alone unit for editing and duplicating EPROMS, as a
slave programmer or as an eprom emulator £695(a).

GANG OF EIGHT PRODUCTION PROGRAMMER

This is a smart, fast programmer with an audible
alarm and a 'conversational' liquid crystal display.
Single key operation discourages mistakes whilst
performing BLANK CHECK, VERIFY and PROGRAM
functions automatically. Programming voltage
selectable 12.5/21/25V. Will program all popular 5V
single rail eproms. It will program 8 eproms at a time
£395(a)

P9000 Range

These new range which will handle ALL current 5V
single rail eproms and copy 8 eproms at a time
comprise three following models:
All models have 16 character display, 10 different
fault detection features and automatic self test, 16
bit programming capability and a selection of high
speed programming algorithms:

P9010: A low cost duplicator..... £795(a)
P9020: With serial interface with 8 different formats
and 8K buffer (expandable to 33K)..... £995(a)
P9030: Top of the range with serial interface with 16
formats, baud rate up to 19.2K, 8K expandable
buffer, editing functions, printing facility, remote
control from a computer..... £1295(a)

UV ERASERS

UVIT Eraser with built-in timer and mains indicator.
Built-in safety interlock to avoid accidental
exposure to the harmful UV rays. It can handle up to
5 eproms at a time with an average erasing time
of about 20 mins £59 + £2 p.p.
UV 12 as above but without the timer £47 + £2 p.p.
For industrial users, we offer UV140 & UV141 erasers
with handling capacity of 14 eproms. UV14 has a
built in timer. Both offer full built in safety features
UV140 £61; UV141 £79, p&p £2.50.

ALL PRICES EXCLUDE VAT

Please add carriage 50p unless
indicated as follows
(a) £8 (b) £2.50 (c) £1.50 (d)
£1.00

We also stock a full
range of
TTLs CMOS, CPU's,
RAMs, EPROMS.
Please write for our
catalogue.

CONNECTOR SYSTEMS

I D CONNECTORS

	Headers	Receptacles	Edge Conns	Grey Cable/m
10 Way	90p	85p	120p	40p
20 Way	145p	125p	195p	85p
26 Way	175p	150p	240p	120p
34 Way	200p	160p	320p	160p
40 Way	220p	190p	340p	180p
50 Way	235p	200p	390p	200p

RS 232 JUMPER LEADS WITH 25 WAY CONNECTORS

24" Single end Male	£5.00
24" Single end Female	£5.25
24" Male to Male	£8.25
24" Female to Female	£9.50
24" Male to Female	£9.00

Other lengths available

TEXTOL ZIF SOCKETS

24 pin.....	£5.75
28 pin.....	£8
40 pin.....	£9.75

GENDER CHANGERS

25 Way D type	
Male to Male.....	£10
Female to Female.....	£10
Male to Female.....	£10

DISC DRIVES

Single Drives

1 x 100k 40T SS: TS55A £100(a) CS55A with psu £125(b)
1 x 200K 40/80 TSS: TS55E £140(b) CS55E with psu £150(b)
1 x 400K 40/80T DS: TS55F £145(a) CS55F with psu £169(a)

Dual Drives

2 x 100K 40T SS: TD55A with psu £250(a)
2 x 200K 40/80T SS: TD55E with psu £325(a)
2 x 400K 40/80T DS: TD55MP with psu £350(a)
2 x 400K 40/80T DS: TD55M with psu £360(a)

BBC compatible disc drives, fully cased and supplied complete with cables, manual and
formatting disc for operation with the BBC micro. These drives can operate in both single
and double density modes and are suitable for use with any micro with Shuggart A400
interface. Mechanisms available separately.

3M FLOPPY DISCS

Authorised Distributor
Data Recording Products

Industry standard high quality discs with guaranteed error free performance for life.

Discs in packs of 10:

40T SSDD £15(c)	40T DSDD £18(c)
80T SSDD £22(c)	80T DSDD £24(c)

MONITORS

All monitors supplied with BBC lead

MICROVITEC 14" RGB

1431 Standard Resolution	£165(a)
1451 Medium Resolution	£240(a)
1441 Hi Resolution.....	£399(a)

MICROVITEC 14" RGB with PAL & Audio

These monitors can receive TV programs thru a Video Recorder	
1431AP Standard Resolution.....	£210(a)
1451AP Medium Resolution.....	£280(a)

MICROVITEC 20" RGB with PAL & Audio

2030CS Std Res	£380(a)
2040CS Hi Res.....	£685(a)

MICROVITEC 20" RGB

2031 Std Res	£260(a)
2040 Hi Res.....	£570(a)

KAGA TAXAN 12" RGB

VISION II Hi Res	£240(a)
VISION III Super Hi Res.....	£340(a)

MONOCHROME MONITORS:

SANYO DM8112CX Hi Res 12" Green Screen.....	£90(a)
KAGA KX1201G Hi Res 12" Etched Screen.....	£99(a)
KAGA KX1202A Hi Res 12" Etched Screen.....	£105(a)
ZENITH 123 Hi Res 12" Green Screen	£68(a)
ZENITH 122 Hi Res 12" Amber Screen	£68(a)

SWIVEL BASE FOR KAGA

Monochrome fitted with Digital Clock.....	£21(c)
Monitor Plinth for the BBC	£13.50(b)

Double Tier Plinth for BBC and flat dual
drive

Microvitec Leads.....	£3.50(d)
Monochrome Leads.....	£3.50(d)

PRINTER SHARER/BUFFER

A unique printer sharer/buffer that provides a simple way to improve the utilisation of the
installed equipment by reducing the waiting time for printing documents. All but the
smallest documents tie up the computer while being printed and the computer remains
out of use until the printing is complete. This is more so in a network which does not have a
dedicated computer for printer operation. This buffer/sharer would free the computers
almost immediately for other uses and in many cases make the use of dedicated printer
server machines unnecessary.

- * STANDARD Centronics interface
- * EACH input port scanned every 5 secs to
check for data. Switching between ports
completely automatic.
- * Data input rate 4800 bytes/sec
- * LED Bargraph indicates percentage
memory used.
- * COPY key allows current document to
be reprinted.
- * Internal check to prove the data
integrity.
- * PAUSE switch allows printing to be
stopped temporarily to allow paper
change, adjust form feed etc. or allows
temporary storage for large number of
small files which can all be printed
together.
- * RESET allows all buffer memory to be
cleared without having to hard break on
the computer.

* 64K buffer capacity. * Mains powered * Compact 7cm x 17cm x 24cm
TSB 64 Buffer/Sharer £245(a)
Cable Set £30

AMPHENOL CONNECTORS

	Solder	IDC
36 Way Centronics Plug	500p	475p
36 Way Centronics Socket.....	550p	500p
24 Way IEEE Plug	475p	475p
24 Way IEEE Socket	500p	500p
PCB Mtg Skt		
Ang. Pin 36 Way	750p	24 Way 700p

D CONNECTORS

	No of Ways	9	15	25	37
Male					
Solder	60p	85p	125p	170p	
Angled Pins	120p	180p	240p	350p	
IDC	175p	275p	325p	—	
Female					
Solder	90p	130p	195p	290p	
Angled Pins	160p	210p	290p	440p	
IDC	195p	325p	375p	—	
Hoods	90p	95p	100p	120p	
Screwlock Hood	130p	150p	175p	—	

TECHNOMATIC LTD

MAIL ORDERS TO: 17 BURNLEY ROAD, LONDON NW10 1ED
SHOPS AT: 17 BURNLEY ROAD, LONDON NW10
(Tel: 01-208 1177 (4 lines) Telex: 922800)
305 EDGWARE ROAD, LONDON W2

PLEASE ADD 50p p&p & 15% VAT

(Export: no VAT, p&p at Cost)

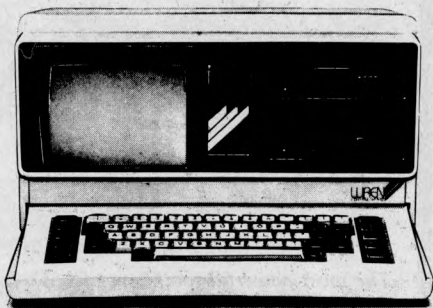
Orders from Government Dep'ts. & Colleges etc. welcome.

Minimum Telephone Order £5.

Detailed Price List on request.

Stock items are normally by return of post.





At £1,000* the Wren is
the desk-top that's not desk-bound.



The Wren Executive System. British made and backed by the distribution expertise of Prism Business Systems.

No other small computer packs in so much for such a price. Simply add up its strengths and you'll see just what we mean:

- Full range of Perfect™ business software including financial planning, word processing and sophisticated filing systems.

- Executive Desk Top System – includes electronic diary, notepad, calculator, time clock and random access card index.

- British Telecom approved on-board autodial modem and communications software for direct access to Prestel™, Micronet 800, and other private viewdata systems.

- Built-in 7" amber screen. Twin disk drive.
- 64K bytes of memory.
- Built-in interfaces include RS232, Winchester disk drive and external colour monitor.

- 3 months free subscription to Micronet 800 and Prestel.

- Fully portable.

No other small computer offers your customers more... so why settle for less.

Carry the company in your hand not on your shoulders

The Wren is designed by Transam Computers Limited. Perfect Software™ is a trademark of Perfect Software Inc. Micronet 800 is the trading style of Telnet Limited and British Telecom. Executive Desktop is the copyright of Quantec Systems and Software Limited. Prestel™ is the trademark of British Telecom. *All prices exclude VAT.



For full details of the
Wren Executive System
send this coupon to:
Pony Microsystems Limited

11 Francis Way 61 Hartfield Avenue
Cippenham, Slough Elstree
Berks. SL1 5PJ Herts. WD6 3JJ
Tel: (06286) 61479 Tel: 01 207 1113
Telex: 295964 FCROFT G

Name: _____

Address: _____

Telephone number: _____

FORTH = TOTAL CONTROL

FORTH programs are instantly portable across the most popular microprocessors.

FORTH is interactive and 20 times faster than BASIC

FORTH programs are structured, modular, and easy to maintain.

FORTH gives control of all interrupts, memory locations, and i/o ports.

FORTH gives full access to DOS files and functions.

FORTH application programs can be converted to turnkey programs.

FORTH Cross Compilers can generate ROMmable code for: 6502, 6809, 68000, 8080, Z80, 8086, 6800, 6801/3, 1802, Z8, 8070, Z8000, 99xxx, LSI-11

We are the **FORTH** specialists, we also stock a large range of books, listings, and implementations for machines ranging from Spectrums to VAXes.

Application Development Systems include **FORTH** with virtual memory, multi-tasking, assembler, full-screen editor, decompiler, utilities, and full documentation.

Z80 or 8080 FORTH – CPM 2.2	£60
8086 FORTH – CPM-86, MSDOS	£105
PC/FORTH – PC/DOS, CPM-86	£105
8086 FORTH- 83 – CPM-86, MSDOS	£120
PC/FORTH – 83 PC/DOS, CCPM	£120
68000 FORTH – CPM-68K	£190

FORTH has 32-bit stacks and directly accesses the whole address space of the processor.

PC FORTH+	£190
8086 FORTH+	£190
68000 FORTH+	£290

Extension Packages include floating point, cross compilers, 8087 support, colour graphics, databases



MicroProcessor Engineering Ltd

21 Hanley Road, Shirley
Southampton SO1 5AP
Tel: 0703 780084



CONDOR DATABASE

Now you can do hundreds of tasks quickly and easily
Without Programming Experience
on your IBM-PC, SIRIUS, APPLE II, APRICOT, RAINBOW, SAMURAI, HYPERION, SUPERBRAIN, WANG, ZENITH etc...

We know the frustrations. You bought a computer to help manage your business better. Then came the realities of software: canned programs; computer languages, programmers, and consultants. Finally you got something running... but it's not what you wanted. To make matters worse, the computer is sitting idle much of the time. And you expected to be able to do so much more...

Condor to the rescue

MGA has a management system for your computer that helps you accomplish hundreds of tasks... quickly and easily... without programming experience. Called **CONDOR DATABASE**, it really helps you do most of the things that prompted you to buy a computer in the first place. Simple things like reminding you of important dates or setting up and printing postcode sorted mailing lists. Or intermediate tasks like organising your files, project control and customer tracking. Or more complex applications like analysing cash-flow and generating extensive management reports. All are accomplished with less time and effort with Condor. Much less!

Easy to use with fast results

Condor Database eliminates complex programming. It uses simple English words to do the things you want to do (French and German versions also available). You'll be amazed how quickly Condor helps manage your business, even if you're a first time user. If you're just buying your first computer, buy it with Condor and get it right from the start! It's no wonder many of the largest hardware manufacturers have tested and package Condor with their computers. Companies like Sony, Sanyo, DEC, NEC, Hewlett-Packard, Monroe and Zenith.

It's not just a database. It's data management. It's a big idea, and once you see how powerful it can make your personal computer you'll know why Condor Data Management software is the right idea at the right time.

Condor is compatible with all microcomputers with CP/M, MSDOS, CP/M-86, PC DOS or TURBODOS. Prices exclude VAT.

Condor Level 1

Single files, simple reports, computations, full screen formatting; **£95**

Condor Level 2

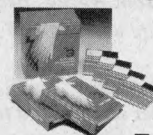
Multiple files, relate datasets, statistics, change datasets; **£195**

Condor Level 3

Fully Relational Database Manager, indexing, report generator; **£295**

Upgrade to next level; **£125**

★ STOP PRESS ★
NEW COLOUR VERSION
NOW AVAILABLE FOR IBM-PC AND COMPATIBLES AT NO EXTRA CHARGE



MGA MicroSystems
140 High Street
Tenterden, Kent
ENGLAND TN30 6HT
Tel: (05806) 4278

MGA are specialists in providing high volume Database Management Systems and will build complex specific application systems using Condor to your order. Already implemented are: Nominal Ledgers; Charity Accounts; Garage and Tour Operators' Systems.

Condor Database — It's simply better!

HISOFT



for the ZX Spectrum

Hisoft is pleased to announce a new compiler for this popular and effective systems programming language. Not a tiny-C but an extensive, easy-to-use implementation of the language. Allows direct execution of compiled statements. Supplied with function library. Available direct from Hisoft for £25, or write for further details.

All prices, UK delivered, relate to 48K ZX Spectrum versions. Our software is available for many other Z80 machines e.g. Amstrad CPC 464, MSX, Memotech, SHARP MZ700, New-Brain, CP/M etc. Please write for details.

HISOFT

ULTRAKIT £9.45

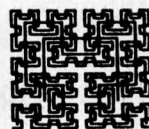
The most powerful toolkit yet for ZX BASIC. All the features you will ever need; AUTO insert, full RENUMBER, block DELETE, CLOCK, ALARM, error trapping, break trapping. Full TRACE with single-step and much, much more. Makes ZX BASIC easy-to-use and powerful.

DEV PAC £14

An excellent assembler, an advanced line-editor, a comprehensive disassembler and a superb 'front panel' debugger all in one package. Used by many leading software houses to write their games. "Buy it!" Adam Denning 1984.

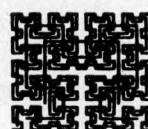
PASCAL £25

A powerful and almost full implementation of Pascal - not a Tiny Pascal. A valuable educational and development tool, programs typically run 40 times faster than a BASIC equivalent. Spectrum version includes Turtle Graphics package. "I haven't seen any other compiler that could match Hisoft's Pascal"



HISOFT

180 High Street North
Dunstable, Beds. LU6 1AT
Tel: (0582) 696421



HISOFT

presents

FONT 464

for the

AMSTRAD CPC 464

FONT 464 is a font designer and character generator especially developed for the CPC 464 microcomputer.

Design your own character fonts and graphic symbols with this very friendly and powerful package.

FONT 464 allows you to create a new design or amend an existing one using set, reset, invert, reflect, rotate, inverse and even animation!

Load and save character sets to/from tape, use the new character(s) from BASIC, design your own animated graphics - all this and more with **FONT 464**.

FONT 464 is supplied with three interesting and amusing character sets for you to experiment with.

★ All this power for: £7.95 inclusive ★

We also have available for the Amstrad CPC 464:

Hisoft Devpac - our full Z80 assembler and disassembler/debugger with more features than you'll ever need.

Hisoft Pascal - a virtually full implementation of Standard Pascal. Compiles and executes incredibly quickly.

Please write to Hisoft for more details of Pascal and Devpac on the CPC 464 or contact Amsoft with your order.

HISOFT

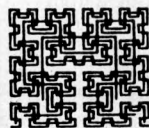
MONQL

A powerful disassembler/debugger for your QL

- MONQL - the latest program development tool from Hisoft.
- MONQL - a versatile and easy-to-use disassembler and debugger for your Sinclair QL computer.
- MONQL - debug your programs, discover the secrets of the QL's operating system.
- MONQL - just look at all these features:
 - front panel display showing registers, memory and disassembly.
 - modify memory and registers.
 - search for bytes, words, strings or even mnemonics!
 - intelligent copy of memory contents.
 - full disassembly to screen, printer or microdrive.
 - single step your programs, ROM or RAM
 - set/reset dynamic breakpoints and much, much more.
- MONQL - supplied on microdrive cartridge with an extensive manual
- MONQL - written by Andrew Pennell, MONQL is a *must* if you want to get the *most* out of your QL.

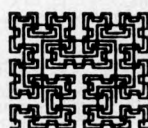
MONQL — ONLY £19.95 inclusive

Export and dealer enquiries please write to us:



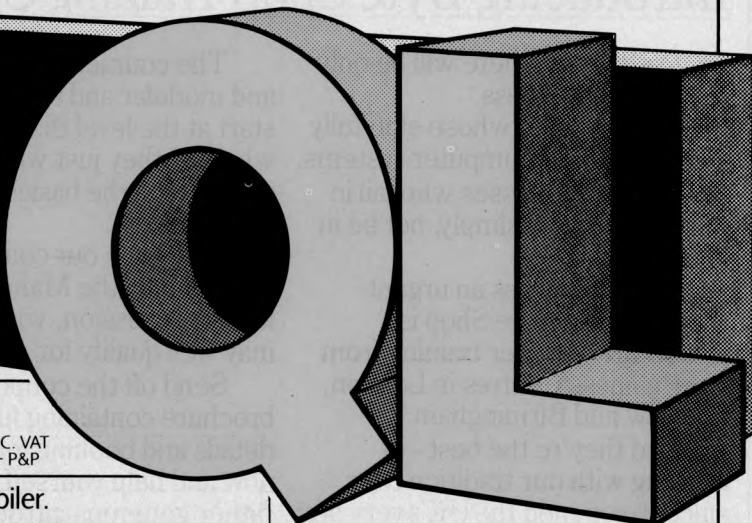
HISOFT

180 High Street North
Dunstable, Beds. LU6 1AT
Tel: (0582) 696421



Write programs to unlock the multitasking power of your QL!
 Use Metacomco's much acclaimed **Development Kits** to create the software for your QL: Use **Assembler** for its speed, and for access to the QL's many features; use **BCPL** for systems programming; writing games, utilities, and applications packages; use **LISP** for manipulating data structures, and for exploring the world of artificial intelligence.

RELEASE THE POWER OF THE



ASSEMBLER £39.95 INC. VAT + P&P

- > Standard Motorola 68000 mnemonics.
- > English error messages.
- > Produces code which can be EXECed, and run as a concurrent job.
- > External references allow linkage to high level languages.
- > Integral linker allows assembler programs to be linked together.
- > Macro expansions.
- > Position independent, absolute or relocatable code can be produced.
- > Conditional assembly.
- > Large range of directives.
- > Fully formatted listings.
- > 30 character variable names and 32-bit values.

BCPL £59.95 INC. VAT + P&P

- > True compiler.
- > Multiple BCPL programs can run concurrently.
- > Full runtime library includes interfaces to QDOS graphics, file operations, window handling, etc.
- > Exception handling provides diagnostics for debugging.
- > Link loader allows linkage of separately compiled segments.
- > Assembler and BCPL modules can be linked together.
- > 32-bit variables use the full QL address space.

Each language is supplied as a complete Development Kit which includes the software (on a Microdrive Cartridge), Metacomco's popular full screen editor, and user manual.

LISP £59.95 INC. VAT + P&P

- > Full support of QL features including window graphics, and screen handling.
- > Compatible with Acornsoft Lisp for the BBC micro.
- > Interpreter.
- > Turtle graphics.
- > Structure editor allows alteration of data structures.
- > Prettyprinter displays programs in structured format.
- > Tracer to aid in debugging.
- > Garbage collector automatically recovers spare memory space.
- > 28-bit integers and 250-character names.

Phone today, or post this coupon to: Metacomco, 26 Portland Square, Bristol BS2 8RZ.

Please send me:

The Assembler Development Kit at £39.95 _____

The BCPL Development Kit at £59.95 _____

The LISP Development Kit at £59.95 _____

I enclose a cheque for £ _____ or debit my ACCESS/VISA Account No. _____

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Card expiry date: _____

Price includes VAT, postage and packing UK mainland only. Delivery allow up to 28 days.

PCW5

ENHANCED!

NOW INCLUDES
ASSEMBLER LINKER*
 AND NEW LOW PRICE **£39.95**

The Metacomco Development Kits are available from HMV, Menzies and many other leading retailers, or direct from Metacomco.

METACOMCO

26 Portland Square, Bristol BS2 8RZ.

Tel: Bristol (0272) 428781

*Existing registered users can obtain an upgrade. Contact Metacomco for details.

QL & QDOS are the trade names of Sinclair Research Ltd.

THE BUSINESS WORLD IS SPLIT BETWEEN THOSE WHO HAVE COMPUTER SYSTEMS-AND THOSE WHO ALSO UNDERSTAND THEM

Introducing Byte Shop Training Centres

Pretty soon there will be only one kind of business.

The business whose staff fully understands its computer systems.

Those businesses who fail in this respect will, simply, not be in business.

That is why—as an urgent priority—The Byte Shop is providing computer training from our Business Centres in London, Glasgow and Birmingham.*

And they're the best—in keeping with our tradition ever since we opened the UK's very first specialist microcomputer centres.

The courses are structured and modular and students can start at the level that suits them whether they just wish to understand the basics or are DP professionals.

And since our courses are approved by the Manpower Services Commission, your company may well qualify for a grant.

Send off the coupon for our brochure containing full course details and booking forms. Do it now and help yourself to our rather generous introductory offer.

TITLE	CODE	DURATION
EDUCATIONAL Understanding Computers — A Jargon Breakdown	ED01	1 day
An Introduction to Microcomputers for Managers	ED02	1 day
Working with Micros	ED03	1 day
Financial Modelling and Business Software — A Familiarisation Workshop	ED04	1 day
WORD PROCESSING An Introduction to Word processing and WORDSTAR facilities	WP01	1 day
WORDSTAR and MAILMERGE User Course	WP02	2 days
DATABASE Database Concepts and DBASE II facilities	DB01	1 day
Writing DBASE II Applications	DB02	2 days
Advanced use of DBASE II software	DB03	1 day
DBASE III conversion	DB04	1 day
INTEGRATED SYSTEM SOFTWARE Lotus 1.2.3.	IS01	1 day
Advanced LOTUS 1.2.3.	IS02	1 day
Symphony	IS03	2 days
Advanced Symphony Users Workshop	IS04	2 days
Framework	IS05	2 days
PROGRAMMING Thinking as a Programmer	PR01	1 day
Programming in MBASIC	PR02	3 days
Programming in PASCAL	PR03	4 days
Programming in COBOL	PR04	5 days
Programming in "C"	PR05	3 days
SYSTEM HOUSE KEEPING PC/MS-DOS	DOS	1 day
Concurrent CP/M	CPM	1 day
MP/M	MPM	1 day

Note: ● Courses start in London on 21st January 1985.

● All products referred to are trademarks or registered trademarks of the companies of origin.

*Courses will also be available shortly in Southampton, Nottingham and Manchester.

The Byte Shop Ltd., Grove House,
Little Paxton, Cambs PE19 4EL
Telephone: 0480 218812

The
BYTESHOP
TRAINING CENTRES

KI A Kode International plc Company

To: Ian James, Training Manager,
The Byte Shop Ltd.,
Grove House, Little Paxton, Cambs PE19 4EL
Telephone: 0480 218812

Please send me a copy of your brochure containing full details of Byte Shop Training Centres.

NAME	COMPANY	POSITION
ADDRESS		
TEL:	Course(s) interested in (state codes)	All (tick)

PCW/3/85



olivetti

ITT
XTRA

SYSTEM OFFERS: FREE STOCK AND INVOICING
SYSTEM AND FREE PRINTER CABLE

Specialists in Business and Accounting Systems

SANYO BUSINESS SYSTEMS

SANYO MBC 555 128K.....	£799
SANYO MBC 55Q 2 × 360K DRIVES.....	£999
SANYO MBC 558 + 10Mb HARD DISK.....	£2065
SANYO MBC WINCHESTER DISK + TAPE STREAMER SUBSYSTEMS 5-20Mb.....	FROM £1500

IBM COMPATIBLES

ITT XTRA	£1795
OLIVETTI M24	£1595
OLIVETTI M24 10Mb 1 × 360K DRIVE	£2750
OLIVETTI M21 PORTABLE PC	£1930
COLUMBIA XT 256K 10Mb.....	£2755

EASY ACCOUNTS. The professional 5-module Accounts
System for only.....**£395**
APRICOT XI.....**£2650**

*Distributors for: MMS, Winchester and Comnet. Sanyo distributors
for Scorpion Easy Accounts System.*

DEALER ENQUIRIES WELCOME

ASHGOLD BUSINESS COMPUTERS LTD

490 NEASDEN LANE, LONDON NW10

Tel: 01-208 0263

**A PROSPEROUS NEW YEAR
STARTS HERE AT**

THE SOFTWARE WAREHOUSE

For the IBM PC and 100% Compatible Machines

SUPERCALC 3.2 with **FASTMATH** a totally integrated
software package. Spreadsheet, letter
writing, text editing, data management &
graphics incorporating **SIDEWAYS** to
rotate a large report 90° for printing on
continuous stationery. RRP £295

SWP £225

EASYWRITER II integrated word-processing, spell-
checking & mail-merging with either
American, English, French or German
dictionary RRP £290 **SWP £220**
(Legal or medical dictionaries available)

EASYFILER database management system RRP
£270 **SWP £210**

OTHER PRODUCTS SELECTED FROM OUR RANGE

	RRP	SWP		RRP	SWP		RRP	SWP
dbase II	£365	£240	PC Forth	£120	£95	Wordstar	£295	£195
dbase III	£495	£330	Pertmaster	£650	£510	WS+Mailmerge	£390	£260
Friday!	£195	£130	Pertmaster +	£850	£665	WS Professional	£495	£330
Open Access	£450	£300	Easy Sales Pro	£360	£240	Easy Planner	£170	£145
Oz	£330	£220	Framework	£495	£330	Multimate	£339	£225

MAIL ORDER ONLY

Please enclose payment with order.
Add 15% VAT to above prices. Post & Packing £2.

THE SOFTWARE WAREHOUSE

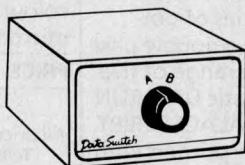
9 Laponum Walk, Yeading, Hayes, Middx. UB4 9PN

Tel: 01-841 1209

**PRINTER SWITCHES FROM
HOMESTEAD ELECTRONICS**

LINK TWO OR MORE MICROS TO ONE PRINTER, PLOTTER, MODEM ETC. OR VICE VERSA

- ★ ROBUST CONSTRUCTION
- ★ SCREENED, METAL HOUSING
- ★ FULLY TESTED
- ★ BI-DIRECTIONAL
- ★ NO POWER REQUIRED
- ★ 12 MONTHS GUARANTEE
- ★ OFFICIAL ORDERS ACCEPTED
- ★ 24 HOUR DESPATCH



SERIAL DATA SWITCHES

RS 232C/V24. 25 way 'D' sockets		
LINES 1 to 8 & 20		
Model R2	2 way switch	£49
Model R3	3 way switch	£57
Model R4	4 way switch	£65
Model R5	5 way switch	£73
Model R8	8 way switch	£110
Model RX	2 way cross-over	£65

ALL 25 LINES		
Model V2	2 way switch	£65
Model V3	3 way switch	£77
Model V4	4 way switch	£89
Model V5	5 way switch	£101
Model VX	2 way cross-over	£89

PARALLEL DATA SWITCHES

CENTRONICS. 36 way sockets		
Model C2	2 way switch	£79
Model C3	3 way switch	£95
Model C4	4 way switch	£119
Model C5	5 way switch	£139
Model CX	2 way cross-over	£119

IBM PC. 25 way 'D' sockets		
Model P2	2 way switch	£65
Model P3	3 way switch	£77
Model PX	2 way cross-over	£89

IEEE-488. 24 way sockets		
Model E2	2 way switch	£89
Model E3	3 way switch	£109
Model EX	2 way cross-over	£129

PLEASE ADD VAT AT 15%. ALL ITEMS CARRIAGE PAID
TRADE, EDUCATIONAL & EXPORT ENQUIRY WELCOME
CABLES ALSO AVAILABLE. EX STOCK & CUSTOM BUILT



HOMESTEAD ELECTRONICS

Trelawney Industrial Court
Trelawney Avenue, Langley
Slough, Berks. SL3 7UJ.
Telephone: (0753) 44269



DISCS

5 1/4"
DYSAN

DISCS

	10-40	50-90	100+
1041D	21.00	20.00	19.00
1042D	32.00	30.00	28.00
2041D	32.00	30.00	28.00
2042D	38.00	36.00	34.00

VERBATIM

	10-40	50-90	100+
MD525	20.00	18.50	17.00
MD550	24.00	22.00	21.00
MD577	28.00	26.00	24.00
MD577	32.00	30.00	28.00

Plus P&P at £1.00 per 10 disks — all disk prices per 10

COMPUTER CARE

5 1/4" Disk Drive Maintenance Kit:

Contains: Diskette cleaning solution, cleaning Dis-
kette, screen cleaning solution, keyboard cleaning
solution, anti-static lint free cloths, absorbent non-
abrasive cleaning cloths, foam cleaning wands, dust
blower.

INTRODUCTORY PRICE OFFER @ £15.00

Plus P&P at £2.50

All prices exclude VAT — add 15% to order value exc. P&P

FREE Computer Supplies Catalogue on request

Send your order and remittance to:

RAPIDATA (NEWBURY) LIMITED

44 LONDON ROAD, NEWBURY, BERKS

Tel: NEWBURY 31134

software that's hard to beat...

MSX
AMSTRAD
48K SPECTRUM

TASWORD TWO

The Word Processor ★

"If you have been looking for a word processor, then look no further."

CRASH June 1984

"The number of on-screen prompts, together with the excellent manual, make it ideal – even for an absolute beginner."

PERSONAL COMPUTER WORLD

September 1983

"Without doubt, the best utility I have reviewed for the Spectrum"

HOME COMPUTING WEEKLY April 1984

TASWORD TWO ZX 48K Spectrum £13.90

TASWORD MSX

The Word Processor

The Tasman Word Processor for MSX microcomputers.

All the features of the Spectrum version.

TASWORD MSX MSX Computers £13.90

TASCOPY

The Screen Copier

Screen copy software for Spectrum with Interface 1 and Amstrad CPC 464. Print high resolution screen copies (in a choice of sizes), and also large 'shaded' copies with different dot densities for the various screen colours. Tascopy supports all eight pin dot matrix printers with Epson type control codes, e.g. Epson RX-80 and FX-80, Shinwa CP-80, Mannesmann Tally MT-80, Star DMP 510/515, Brother HR5, and also Amstrad DMP 1 with the CPC 464.

TASCOPY ZX Spectrum £9.90

TASCOPY 464 Amstrad CP 464 £9.90

TASWORD 464

The Word Processor

The Amstrad implementation of Tasword Two plus many extra features.

TASWORD 464 Amstrad CPC 464 £19.95

TASMERGE

The Mail Merger

Transfer data from MASTERFILE to TASWORD TWO! Letters and forms typed on TASWORD TWO can be printed with addresses and data taken from MASTERFILE. The mail merge facility allows, for example, multiple copies of a letter to be printed, each containing a different name and address taken from your MASTERFILE data. To use TASMERGE you must have one or more microdrives as well as TASWORD TWO and MASTERFILE by Campbell Systems. (version 9 or later).

TASMERGE ZX 48K Spectrum £10.90

TASPRINT

The Style Writer

A must for dot-matrix printer owners! Print your program output and listings in a choice of five impressive print styles. TASPRINT utilises the graphics capabilities of dot-matrix printers to form, with a double pass of the printhead, output in a range of five fonts varying from the futuristic DATARUN to the hand-writing style of PALACE SCRIPT. TASPRINT drives all dot-matrix printers with bit image graphics capabilities and can be

used to print TASWORD text files. TASPRINT gives your output originality and style!

TASPRINT ZX 48K Spectrum £9.90

TASPRINT Amstrad CPC 464 £9.90

TASWIDE

The Screen Stretcher

With this machine code utility you can write your own Basic programs that will, with normal PRINT statements, print onto the screen in the compact lettering used by TASWORD TWO. With TASWIDE you can double the information shown on the screen!

TASWIDE ZX 48K Spectrum £5.50

TASMAN PRINTER INTERFACE

Plug into your Spectrum and drive any printer fitted with the Centronics standard parallel interface. Supplied complete with ribbon cable and driving software. The user changeable interface software makes it easy to send control codes to your printer using the method so successfully pioneered with TASWORD TWO. The cassette also contains fast machine code high resolution full width SCREEN COPY SOFTWARE for Epson, Mannesmann Tally, Seikosha, Shinwa, Star, and Tandy Colour Graphic (in colour!) printers. Compatible with microdrives and ZX Interface 1.

PRICE £39.90

TASMAN SOFTWARE

All prices include VAT and post and packaging.
Telephone orders: Leeds (0532) 438301

★ Available from larger branches of Boots.

Tasman

SOFTWARE

Springfield House, Hyde Terrace, Leeds LS2 9LN. Tel: (0532) 438301

If you do not want to cut this magazine just write your order and post to:

TASMAN SOFTWARE, dept. PCW, Springfield House, Hyde Terrace, Leeds LS2 9LN.

I enclose a cheque/P.O. made payable to Tasman Software Ltd. OR charge my ACCESS number

NAME _____

ADDRESS _____

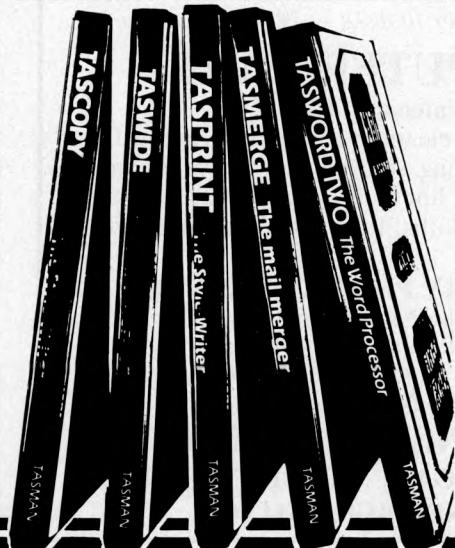


COMPUTER	ITEM	PRICE
_____	_____	£ _____
_____	_____	£ _____
_____	_____	£ _____

Outside Europe add £1 for each item
airmail £ _____ TOTAL £ _____

Send me the FREE Tasman brochure
describing your products. tick here: ☐
I would like to know more about your
programs for:

ZX Spectrum ☐ MSX ☐ Amstrad CPC 464 ☐



I.B.M. P.C. – A.C.T. APRICOT – COMMODORE 64

NOW THERE IS SOFTWARE WHICH GIVES YOU FULL WORD PROCESSING FACILITIES

You have bought your micro computer, but you cannot find a software package which gives you full word processing facilities.

Now your search is over, VIZAWRITE/VIZASPELL is a twin package which turns your system into a complete word processor, with a 30,000 word spelling checker. Plus full Mail Merge facilities.

It literally allows you to type, edit, merge, and select any passage or document in your system. Unlike other software, access time is near instantaneous.

The 30,000 word spelling checker means that every letter or document is word perfect.

The VIZAWRITE/VIZASPELL twin package has been individually developed for the **I.B.M. P.C.**, the **A.C.T. APRICOT**, and the **COMMODORE 64**. Thus each package is superior to any competitive software available for these machines.

NEW — VIZASTAR for the **COMMODORE 64**. A Spreadsheet, Data Base and full Graphics Program. Allows you to set up bookkeeping/invoicing program at a quarter of the normal cost. Only £99.95 inc VAT.

VIZAWRITE/VIZASPELL IBM PC

£269.00 inc VAT

VIZAWRITE/VIZASPELL ACT APRICOT

£269.00 inc VAT

VIZAWRITE/VIZASPELL COMMODORE 64

£99.99 inc VAT

For a **FREE** trial on all our products **RING**

MONICA TUFFY
01-521 5134/5

Media & Software Centre
33 MELBOURNE ROAD
LONDON E17 6LR

I would like FREE trial/Literature

NAME

POSITION

COMPANY

ADDRESS

TEL NO:

MY SYSTEM IS

At last! Available at under £50 (normally £59.50)

F. S. ENTERPRISES

compu-desk

THE HOME FOR YOUR COMPUTER



IDEAL FOR THE QL

Superbly styled in a rich teak effect finish and brown frame.

And the teak finish is easy to clean. Suitable for use with all leading makes of personal home computers: Spectrum, Vic 20, Commodore 64, Oric, Dragon and the QL.

There's room for a tape-recorder/printer, disk drives, manuals, etc. Cable outlets rear of stand.

36" W x 34" H x 19" D

Twin-wheel castors, for maximum mobility, on tubular steel legs — for that professional look.

It's compact, mobile, attractive and can be moved out of the way with the maximum of ease and efficiency. Therefore the Compu-Desk is ideal for the bedroom or study where space is at a premium.

Easily assembled, just slot together and tighten fittings.

A drawer to fit shelf under work-top is available. Sent as a flat-pack with easy instructions. Money back guarantee if not satisfied provided the goods are returned undamaged within 72 hours of delivery.

T.V & computer supplied by Curry's.

And please allow 7-10 days for delivery.

Send this Ad with order

British made

Keep this ad — Limited Period only

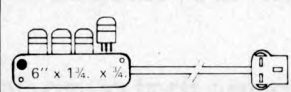
To order send Cheque/PO (made out to F.S. Enterprises) made out for £54.95 (includes £5 P+P). Address: 18 Power Court, Church Street, Luton, Bedfordshire LU1 3JJ or £64.45 if "4 into 1" is included. You can also collect at above address.

NAME _____

ADDRESS _____

CHEQUE/POs FOR £ _____

"4 into 1" mains connector with fitted 13 amp plug to tidy-up cables and leads from four appliances. Just £9.50 extra when ordered with Compu-Desk.



INQUIRIES : Tel. 0582 27663

Do you own or use two or more computers with incompatible disk formats? Then you need our universal

«FILE MOVER»

This easy-to-use file transfer program enables you to transfer any type of files — including .COM-, .CMD- and .EXE-types of files — from one computer to another by means of a serial link — even if they use different operating systems! A special protocol with checksums and automatic retransmission ensures error-free file transfers.

Available for CP/M, CP/M-86 and MS-DOS (PC-DOS).

Prices: For CP/M : £ 49.95
For CP/M-86 or PC-DOS (MS-DOS) : £ 69.95
For any two o/s's : £ 99.95

We also offer the following easy-to-use and well-documented utilities:

* XSUB for CP/M-86 : £ 39.95
* DISK UTILITY PACKAGE for CP/M (2.2) : £ 79.95

Includes disk dump and patch, disk test, duplication and various file recovery utilities.

«The file recovery aid alone makes it worth the price». «-- very well -designed and friendly human interfaces» (Microsystems).

* TERMINAL for CP/M, CP/M-86 and PC-DOS (MS-DOS) : £ 99.95

converts your microcomputer into a powerful terminal. Includes ASCII file upload and download facilities.

Disk Formats available: 8" ss/sd, IBM-PC/XT, DEC Rainbow 100, Osborne, Zenith hard and soft sector, Superbrain (JR), DEC-VT 180 (DD), TI Professional (DD), Kaypro II, Access ss/dd, NEC PC-8001 A, XEROX 820 (SD), Xerox 820-II (DD), TRS-80, Mod I (Omikron (CP/M), TRS-80, Mod 3 (MM/CPM), Morrow Micro Decision.

Include £ 5 per order for handling and shipping. Specify computer, disk format and o/s.

VISA accepted.

ek elektroconsult as
P.O.BOX 846, N-3001 DRAMMEN, NORWAY

Tel: *(47) 3 83 15 00

DISK DRIVES

LOW COST FLOPPIES

80 Track DSDD 1.0Mb..... £135
40 Track DSDD 0.5Mb..... £135

WINCHESTERS

15 Mb half Height..... £600
27 Mb Full Height..... £750
SASI Controllers £335

PCB'S

8x8 NAS-BUS Compatible

Z80 CPU + 64K RAM £230
Video/Floppy Cont £199
64K RAM Card..... £150
256K RAM Card..... £285
Floppy/SASI/Serial..... £185
Serial/Parallel I/O..... £175
Real Time Clock..... £35
Kits available P.O.A

CP/M PLUS

Includes RMAC, MAC and LINK etc plus full documentation

Now only £199

Full software support for Map 80, Gemini and Nascom computers

NEW! NEW! NEW!

8088 CPU + 256K RAM £525
Concurrent PC-DOS soon available for NAS-BUS

SYSTEMS

MAPCOM CP/M System £1760
RACPAK Dev. Pack..... £1995
Various configurations

MAP 80 SYSTEMS LTD

UNIT 2, STONEYLANDS ROAD, EGHAM, SURREY. TEL: 0784 37674

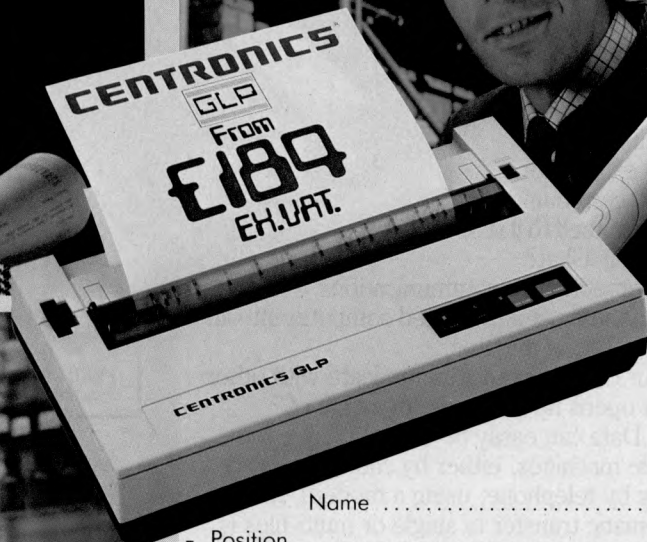
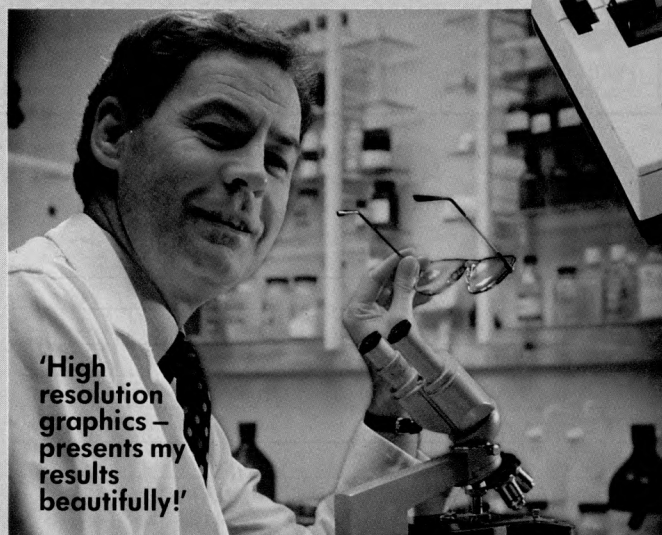
ACCESS AND BARCLAYCARD ACCEPTED.
ALL PRICES EXCLUDE VAT AND P&P.
SPECIAL OFFERS WHILE STOCKS LAST.
CALLERS WELCOME BY APPOINTMENT.
RING FOR FURTHER INFORMATION

Everyone's saying it's a Great Little Printer!

Now you can afford high quality printing on plain paper, even with the simplest microcomputer system.

- * Full IBM-PC compatibility
- * Nine-pin print head * Original plus two copies * 80-132 columns at 10-17 cpi
- * Optional NLQ printing with 18 x 23 matrix * 50 cps draft speed
- * 48 international characters
- * Optional tractors * High-resolution pin-addressable graphics
- * Light and compact

The New Centronics GLP



Please send full details on the GLP and the address of my nearest distributor

Name

Position

Organisation

Address

PCW.3

CENTRONICS

MORE THAN JUST AN INTERFACE

Centronics Data Computer (UK) Ltd Petersham House
Harrington Road London SW7 3HA Tel: 01-581-1011

TURNS BRAINBOXES INTO CHATTERBOXES



Computers are like people. They can learn from each other. But first they have to communicate. If your computer keeps itself to itself, why not introduce it to Sage Chit-Chat?

Chit-Chat is a versatile data communications program that can turn the most introverted computer into an outgoing conversationalist, in minutes.

By enabling your computer to communicate with other machines, Chit-Chat opens up a whole new range of possibilities for you. Data can easily be transferred, even between incompatible machines, either by cable if both are in the same building, or by telephone, using a modem. In this way, manual or automatic transfer of single or multi-files is possible between two machines, anywhere in the world.

Chit-Chat also gives you access to electronic mail systems, such as Telecom Gold and Easylink, which provide private and public mailbox facilities, plus worldwide telecommunications, telex and information management.

With Chit-Chat your computer can also engage in some very informative conversations with viewdata services like Prestel.

What's more, you'll be glad to know that you don't have to be a brainbox to turn your computer into a chatterbox. The Chit-Chat program is simple to understand, easy-to-learn and use, and suitable for use on a range of microcomputers.

All told, it's a pretty impressive story. And, as yet, we haven't even mentioned the price. £130 + V.A.T. That's all.

A small price to pay to give your computer a whole new social life. Currently available on IBM PC, Apricot, Wang PC, Sharp 5600, Epson PX8.

INCLUDES **FREE**
SUBSCRIPTION TO

TELECOM GOLD

Buy the Sage Chit-Chat program before March 31st, 1985, and you get a FREE subscription to Telecom Gold electronic mail service. Forget the standard registration fee of £100 – instead you pay only the minimum charge of £10 per month!

SAGE CHIT-CHAT

Please send me more details about Sage Chit-Chat and the address of my nearest dealer.

Name _____

Position: _____

Company: _____

Address: _____

Tel: _____

My Computer is a: _____

I do not have a Computer ☐

Sagesoft Limited, NEI House, Regent Centre, Newcastle upon Tyne NE3 3DS. Telephone: 091 284 7077. Telex: 53623 SAGESL G.

BETTER SAGE THAN SORRY

POM

New from Xebec —



The 9710H Slimline Disk Subsystem

The 9710H disk subsystem — slimline in form factor, but filled with system features:

- 10 Megabyte formatted capacity using half high 5¼-inch Winchester disk unit.
- Universal SASI interface for system connection to wide range of popular microcomputers.
- Available selection of Xebec host adaptor cards to allow easy add on to existing microsystems.
- Automatic data error detection and correction to give high data integrity.
- Small 'footprint' to minimise work space required.
- No fan convection cooling for low acoustic noise — ideal for office environment.

- Professional I/O connectors with provision for easy daisy chaining of additional box on SASI bus.
- Includes widely used and industry proven Xebec controller technology.

Good looks combined with good features make the 9710H a very attractive box.

The Xebec 'Xero D' signature that appears on this page is the quality mark of the company. It identifies zero defect quality as the goal on every program and product within Xebec. This commitment to quality and a major continuing investment in both product and manufacturing technology are earning Xebec its position as a major supplier of advanced technology product for microcomputer systems.

Xebec Systems Ltd.,
1st Floor, Cockayne House,
Crockhamwell Road,
Reading RG5 3JH
Tel: (0734) 693511
Telex: 849443

XEBEC
The Zero Defect
Company

Belgium — Tel: 32-02-7629 494, Telex: 65054. Italy — Tel: 39-6-350201, Telex: 620114.
Germany — Tel: 49-89-6372766, Telex: 5212201. France — Tel: 33-1-5605438, Telex: 206223.

**NEED
A
COMPUTER**

**WHERE
TO
GO?**

**WORLDWIDE
COMPUTERS**

WHY?

**THEY KNOW
WHAT THEY'RE
TALKING
ABOUT**



**01-947
8562**

COMPUTERS

Apricot F1 256K RAM	£899.00
Apricot 256K 2x315 D/D+Monitor	£1399.00
Apricot 256K 2x720 D/D+Monitor	£1549.00
Apricot 256K 5 MB HD.D+Monitor	£2099.00
Apricot 256K 10MB HD.D+Monitor	£2799.00
BBC Micro Computer	£320.00
Canon MSX Computer	£215.00
Commodore 16 Starter Pack	£99.00
Commodore Plus 4	£219.00
Commodore SX 64 (Portable)	£575.00
Epson Portable PX8	P.O.A.
Epson Portable PX8 + RAM	P.O.A.
Epson QX10 + RX80 + Cable	£1599.00
IBM PC 64 1xDisk	£950.00
IBM PC 64 10MB Disk	£1800.00
IBM PC XT 10MB Disk	£2400.00
IBM Portable 1xDisk	£1444.00
IBM Portable 10MB Disk	£2288.00
IBM PC AT 1xDisk	£2345.00
IBM PC AT 20MB Disk	£3456.00
Sanyo MBC555 2x160K +Monitor	£889.00
Sinclair QL Computer	£330.00
Sirius 1' 128K 1.2MB	£1650.00
Sirius 1' 256K 2.4MB	£2150.00
Sirius 1' 256K 1.2+10.6MB	£2950.00
Televideo	P.O.A.
Wren Computer	£849.00

DAISY WHEELS

Brother HR5	£130.00
Brother HR1	£255.00
Brother HR15	£325.00
Brother HR25	£555.00
Brother HR35	£695.00
Daisy Step 2000 (20CPS)	£225.00
Diablo 620 (RO)	£675.00
Diablo 630 (API)	£1310.00
EP 44 Personal Elec. Printer	£190.00

1600 Flowriter IBM-PC 8K.QD	£1449.00
Hitachi 672 Plotter	£395.00
Juki 6100	£319.00
Juki 6300 Printer (40 CPS)	£675.00
Quen-Data Daisywheel Printer	£225.00
Qume Letter Pro 20	£450.00
Qume 11/40 (RO)	£1175.00
Richo RP1300	£875.00
Ricoh RP1600	£1175.00
Smith Corona TP1	£175.00
TEC 10-40 D/W Printer	£845.00

PERIPHERALS

12in Apricot Monitor (+ £50 On System)	£212.50
F1 9" Mono Monitor	£175.00
Colour Monitor for Apricot F1	£349.00
Cables from	£10.00
Commodore 1702 Col Monitor	£175.00
Epson Acoustic Coupler	£130.00
Microvitec 20" Colour Monitor	£280.00
Sanyo 2112 Green Screen 15MHS	£65.00
Sanyo 8112 Green Screen 18MHz	£85.00
Sanyo 3125 Col Med Res 400PIS	£175.00
Sanyo 3117 Col Hi Res 600PISC	£279.00
Monitor for QL	£230.00

Keyboards, cable, interfaces, tractor feeds, sheet feeds, disks, software, up grades, listing paper, ribbons, daisy wheels available for most products.

All prices excluding VAT

DOT MATRIX

Anadex DP 9000	£799.00
Brother M1009 Dot Matrix Printer	£155.00
Canon PW 1080A (NLQ)	£295.00
Canon PW1156 A (NLQ)	£355.00
Commodore MPS 801	£155.00
Commodore MPS 802	£250.00
Epson RX80T	£190.00
Epson RX80 F/T	£215.00
Epson FX80	£320.00
Epson RX100 F/T Printer	£340.00
Epson FX100 F/T	£425.00
Epson LQ 1500 NLQ Printer	£895.00
Mannesmann Tally MT80	£185.00
Mannesmann Tally MT160	£399.00
Mannesmann Tally Pixy Plotter	£450.00
Mannesmann Tally MT180	£539.00
MP 165 NLQ Printer	£255.00
OKI Microline 82A Printer	£249.00
OKI Microline 83A	£389.00
OKI Microline 84 (P)	£629.00
OKI Microline 92 (P)	£365.00
OKI Microline 2350 (P)	£1449.00
Panasonic KP 1091 (IBM + NLQ)	£269.00
Radix 10 (NLQ)	£449.00
Radix 15 (NLQ)	£549.00
Shinwa CP80 AF/T	£189.00
Star Delta 10	£319.00
Star Gemini 10X1	£195.00
TEC 1550 (P)	£459.00
TEC 1550 (S)	£499.00

Worldwide Computers Limited, Spa House, 11-17 Worple Road,

Wimbledon, London SW19 4JS Telex: WOWICO 8955888

**NEW
LOW
PRICES**

WHY PAY MORE

**NEW
LOW
PRICES**

CUMANA DS/DD DISCS IN THEIR OWN LIBRARY BOX

Cumana discs are really Fuji DS/DD 96 TPI discs in Cumana's own packaging. This includes a Plastic Flip-Top Library Box. These discs are suitable for all makes of disc drive including single sided ones.



PRICES INCLUDE DELIVERY

1-5 BOXES DS/DD 96 TPI	£17.50 + VAT
6-10 BOXES DS/DD 96 TPI	£17.00 + VAT
10- BOXES DS/DD 96 TPI	£16.50 + VAT

48 HOUR DELIVERY SERVICE

VISA

**PLEASE SEND PAYMENT OR PHONE TO USE VISA CARD
LARGE QUANTITY AND EDUCATION DISCOUNTS GIVEN**

Micro Resources Limited

**Southfield House, 11 Liverpool Gardens, Worthing, Sussex BN11 1RY
Telephone: Worthing (0903) 213174**

VicOdden's

London's Computer Specialist
of London Bridge

MEGADEALS

Trade-in your
weeny 1/2K Hoity-Toity 3000
for the latest
30 Mega Thingy Quality Leap.
We also buy Computers &
Peripherals for CASH
(If you can't put up
with its superior
comments having spent
24 hours playing 'The Hobbit'
and getting .002%)
We'll even take your
sooper-dooper
computer gear
in part exchange for
weird but wonderful
Hi-Fi rigs, Walkpersons etc
from our
Lo/Mid/Hi-Fi store
or against Niknok, Conan,
Printax, Oilmouse cameras
and 30,000mm lenses
from our two
photographic emporiums.



6, London Bridge
Walk, London SE1
Tel: 01 403 1988
Open 8.30-6pm
Mon-Frid
9am-1pm Sat

DISKS

DISKS

DISKS

BEST PRICES - TOP QUALITY - FAST DELIVERY

***** PRICE PROMISE *****
We will better any genuine delivered price advertised in the current issue of
PCW for Boxes of Disks shown in the list below. Please Telephone for price.

QUALITY FACTORY SEALED DISKS NORMALLY SAME DAY DESPATCH
5.25" DISKS

BOXES OF 10 DISKS		Prices per Box (£)		
		1-4	5-9	10-49
DYSAN				
	104/1D	HR S/side D Dens	48tpi 40Tr	17.00 16.25 15.50
	104/2D	HR D/side D Dens	48tpi 40Tr	24.00 23.25 22.75
	204/1D	S/side Q Dens	96tpi 80Tr	24.50 23.75 23.00
	204/2D	D/side Q Dens	96tpi 80Tr	30.50 29.75 29.00

VERBATIM	DATA LIFE (5 Year Warranty)		15.25	15.00	14.50
	MD525-01HR S/side S or D Dens	48tpi 40Tr	20.50	19.75	18.50
	MD550-01HR D/side S or D Dens	48tpi 40Tr	20.50	19.75	18.50
	MD577-01HR S/side Q Dens	96tpi 80Tr	28.00	27.25	26.00

10 or 16 hard sectors at same price. Add £1.00 for plastic case.						
VEREX						
MD200-01HR	S/side	S Dens	48tpi	40Tr	14.25	13.75 13.25

MEMOREX	MD200-01HR S/side S Dens		48tpi 40Tr	14.25	13.75	13.25
	(5 year warranty)					
	3431 HR S/side S Dens	48tpi 40Tr	Please Telephone for			
	3481 HR S/side D Dens	48tpi 40Tr	MOST COMPETITIVE			

BASF	3491 HR D/side D Dens		48tpi 40Tr	Prices		
	3504 HR S/side Q Dens		96tpi 80Tr			
	3501 HR D/side Q Dens		96tpi 80Tr			
	1D S/side D Dens		48tpi 40Tr	10.99	10.50	10.00

BASF (Qualimetric)	** Special Offer - FREE Library Box **					
	1X HR S/side S Dens	48tpi 40Tr	14.60	14.20	13.80	
	1D HR S/side D Dens	48tpi 40Tr	16.50	16.00	15.50	
	2D HR D/side D Dens	48tpi 40Tr	21.50	20.75	19.50	

BASF	1D/96 HR S/side Q Dens		96tpi 80Tr	21.50	20.75	19.50
	2D/96 HR D/side Q Dens		96tpi 80Tr	25.00	24.25	23.50
	HR denotes Disks with Reinforced Hub Rings.					

ACCESSORIES	HCK5 Head Clean Kit with Fluid		14.90	14.50	14.00
	LC5 5.25 EGLY Library case		1.90	1.80	1.70
	LB40-5 ABA Lockable Box 40 Cap inc Disk Pen		13.50	13.00	12.50
	LB50-5 ABA Lockable Box 50 Cap inc Disk Pen		14.75	14.25	13.75

ACCESSORIES	LB90-5 ABA Lockable Box 90 Cap inc Disk Pen		16.50	16.00	15.50
	VCK-5 Verbatim 5" Head clean kit		6.40	6.20	6.00
	VCD-5 Verbatim 5" H/c disks (per 10)		12.50	12.30	12.10
	DL-5 Disk Labels 100 (5 colours)		4.50	4.25	4.00

ACCESSORIES	DM-5 Disk Mailers 4 disk cap (per 100)		21.00	19.50	18.50
	3.5" DISKS				

SONY	OM-D3440 S/side D Dens		80Tr	34.00	33.25	32.50
	OM-D4440 D/side D Dens		80Tr	45.00	44.25	43.50
	MF 350 S/side D Dens		80Tr	34.50	33.25	32.50
	BASF (Qualimetric) FD3.5 S/side		80Tr	37.00	36.00	35.00

0M-D4440	D/side D Dens	801F	45.00	44.25	43.50
VERBATIM					

VERBATIM	DATA LIFE (Five Year Warranty)		24.00	23.00	21.50	
	FD34-9000 S/side S Den		24.00	23.00	21.50	
	FD34-8000 S/side D Den		27.75	26.75	25.25	
	FD34-4001 D/side D Den					

MEMOREX	(Five Year Warranty)					
	1S S/side S Dens					
	1D S/side D Dens					
	2D D/side D Dens					

BASF (Qualimetric)	1X S/side S Dens		21.00	20.00	19.00	
	1D S/side D Dens		24.00	23.00	21.00	
	2D D/side D Dens		26.00	25.00	23.00	
	ACCESSORIES					

S10-3.5	SEE-10 Library Box	2.30	2.15	2.0
LB40-3.5	ABA Lockable Box 60 Cap inc Disk Pen	15.50	15.00	14.5

PAPER-LABELS-CASSETTES	PAP1 9.5"x11" 60gsm 2000 sheets		11.00	10.50	10.00	
	PAP3 A4 80gsm Bond 2000 Sheets		24.50	23.50	22.50	
	PAP4 A4 90gsm Bond 1000 Sheets		13.50	12.75	11.50	
	LAB1 89mmX36mm 2 on web 8000 labels		25.00	22.00	21.00	

PAPER-LABELS-CASSETTES	C12 C12 Quality Screw Assembly(10)		4.50	4.30	4.10	
	RIBBONS - PRINTWHEELS - PRINTERS - SOFTWARE					
	Telephone or write for very competitive prices on a large range of goods.					
	Please contact us for Quantity Discounts (50+ boxes) and Trade Accounts.					

Official orders accepted from Government or Educational Establishments.					
---	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

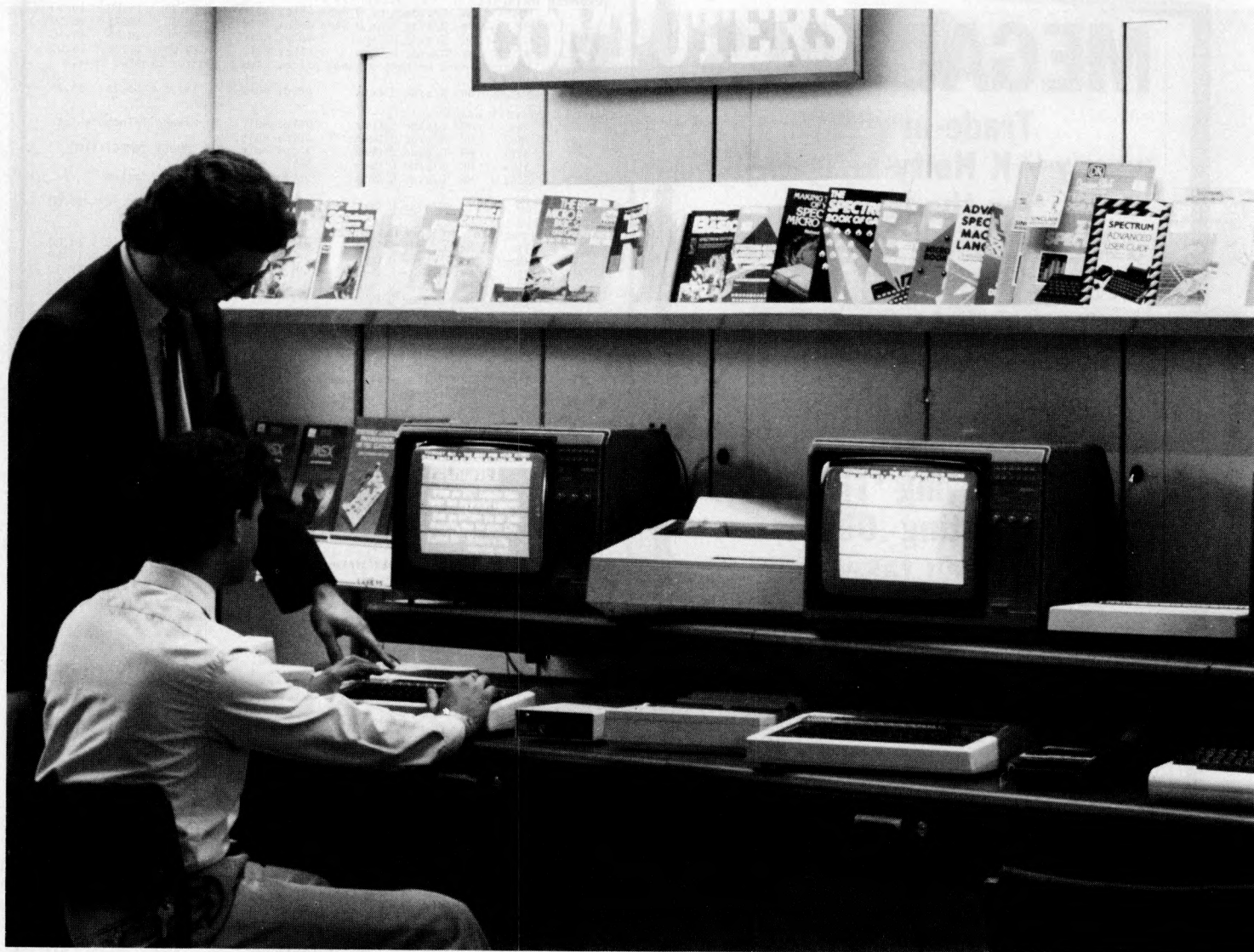
--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

--	--	--	--	--	--

Laskys: The



The best name for micros – now in a high street near you.

If you're buying a micro you need someone who can cut through the confusing mass of information and give you some authoritative advice, on a system that best meets your needs. The best place to get that advice is Laskys – the Data Base where we sell micro

hardware and software at bargain prices.

We have one of the broadest Hardware ranges anywhere in the U.K., including the following top brand names: Acorn, Atari, Apple, Brother, Cumana, JVC, Microvitec, Sinclair and Sony, to name a few.

We also have an impressive range of Software packages for Games, Education and Business use. And, of course, we also supply monitors, disk drives, printers, modems, and all the peripherals

All credit offers subject to acceptance by Laskys credit brokers. Ask for written details. Typical APR 33.7% subject to status. Prices correct at time of going to press and include VAT at 15% but may be subject to variation. All offers subject to availability. *Two year guarantee on parts and labour, Hi-Fi and television. For VCR's, portable equipment, video cameras, computers and peripherals, one year. Hi-Fi and micro sundries 6 months. Optional 5 year guarantee. These are in addition to your statutory rights.

Data Base.



you're ever likely to need.

We also make a point of encouraging you to test our micros before you buy, after first of all discussing your requirements with our sales staff. Then we can recommend the right package to suit your own particular needs.

The story doesn't end when you've made your purchase. Our guarantees and after sales services then come into play. We give a 1 year guarantee on most items and a 2 year guarantee on many

others. An optional 5 year guarantee is available, should you require it. Then, of course there's Servicepoint, which is a unique repair and back-up service to put things right should they go wrong.

But don't just take our word for it. Take our advice and have a word with our knowledgeable and enthusiastic staff.

There's a Laskys Data Base near you.

**A word of advice
about micros.**

LASKYS

CENTRAL LONDON STORES: 13/15 BRENT CROWN SHOPPING CENTRE, 18/19 EALING BROADWAY CENTRE, 42 TOTTENHAM COURT ROAD, 257 TOTTENHAM COURT ROAD. OUTSIDE LONDON: ABERDEEN, BEXLEYHEATH, BIRMINGHAM, BRIGHTON, BRISTOL, BROMLEY, CAMBRIDGE, CARDIFF, CHATHAM, CHELTENHAM, CHESTER, COLCHESTER, COVENTRY, CRAWLEY, CROYDON, EDINBURGH, ENFIELD, EXETER, GLASGOW, GLOUCESTER, GUILDFORD, HARLOW, KINGSTON, LEEDS, LEICESTER, LEWISHAM, LIVERPOOL, LUTON, MAIDSTONE, MANCHESTER, NEWCASTLE, NORTHAMPTON, NOTTINGHAM, OXFORD, PETERBOROUGH, PLYMOUTH, PRESTON, READING, RICHMOND, ROMFORD, SHEFFIELD, SLOUGH, SOUTHAMPTON, SOUTHEND, WATFORD, WOLVERHAMPTON, YORK.

MIR MICROCOMPUTER RENTAL

From Micro-Rent, Britain's top-value specialist in microcomputer rental.

MACINTOSH
£40 * PER WEEK



APRICOT
£40 * PER WEEK



SIRIUS
£46 * PER WEEK



IBM PC
£46 * PER WEEK



- Try before you buy
- Flexible terms — weekly, monthly, annual
- No capital outlay/immediate delivery
- Purchase option with rebate of rental

Micro-Rent is Britain's top-value microcomputer rental specialist. You can hire on a short term basis, and give the leading machines a thorough trial in your own office, before deciding on the right one for your needs.

If you already use a micro, Micro-Rent can supply additional machines for short-term projects, or to cover breakdowns. Extra printers or monitors also available.

Micro-Rent is independent of any manufacturer, and offers expert impartial advice on all aspects of microcomputer use.

CALL TODAY 01-833 2531

*Prices quoted are based on 3-month rental, excluding VAT.



OSBORNE
IBM PC
SIRIUS

APRICOT
APPLE IIe
LISA
MACINTOSH

MICRO-RENT

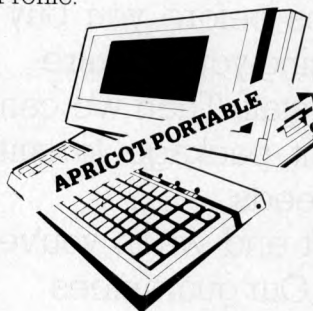
127 Cloudesley Road, London N1

The deal that no other computer dealer can offer!

Data Profile offers you all the expert help you need, in choosing the right system for your individual needs from the variety of software programs and hardware options available. Plus a very important extra. A **guaranteed** buy-back price if you find, as people often do, that your first machine isn't the one you want to stick with.

Because of its close association with MicroRent, Data Profile can give you almost any combination of rental, lease or purchase option.

So when you need the best advice, and the best terms for a business system, call Data Profile.



Authorised dealers for Apple and ACT.

127 Cloudesley Road, London N1. 01-833 2532



DATA PROFILE LIMITED

Get Me Results!



CW 3/85
Please rush
me details of
WORD RESULT
CALC RESULT
£275.00 + VAT each
or £465.00 + VAT for both

NAME _____
POSITION _____
COMPANY _____
ADDRESS _____
Tel: (0344) 778800 Dealer enquiries welcome

Send to: HANDIC SOFTWARE LIMITED, Berks, RG11 7LT,
12, Albert Road, Gillingham, Kent, ME13 9JL

PRESSURE FROM THE BOSS?

Do you find the integrated software you are using isn't doing all it claims – or is it just too complex?

Why not let CALC RESULT / WORD RESULT help you get the results your boss is looking for?

Word Result (the word processor) and Calc Result (the financial spread sheet) have been created with true integration – giving you the freedom to use each program either separately or together. In today's office, where work overlap and machine overload can become a big problem, Calc Result and Word Result can help you take the strain.

WORD RESULT features:—

- Eight European languages with true hyphenation
- Mail-merge
- Automatic saving of your document whenever you stop typing

CALC RESULT features:—

- 64 X 254 X 32 pages
- Automatic locking of formulas
- Pie and bar charts, saved and printed
- Consolidate all your work with ease

Both CALC RESULT and WORD RESULT have easy to use commands and help screens.

These are just some of the features available in each program . . . and then when you put them together . . . !

Why not send the coupon in TODAY and find out what else these programs have to offer?

handic
software



Oxford Pascal is Fast

Oxford Pascal compiles down to FAST COMPACT P-code, giving you the real speed and power of Pascal, together with the ability to compile very large programs.

Oxford Pascal is Standard

Oxford Pascal is a full extended implementation of Standard ISO Pascal. This means that you can compile any Pascal program (subject to size), written on any computer, anywhere.

Oxford Pascal is Compact

Because it compiles into P-code, Oxford Pascal reduces programs into the most compact form possible. In fact it allows you to pack more code into your BEEB than any other language, and should your programs become too large, you can still use the CHAIN command to overlay limitless additional programs without losing data.

Graphics & Sound Extensions

In addition to the entire Pascal language, Oxford Pascal features a whole range of Graphics (all modes) and sound extensions designed to make maximum use of the BBC computer. Oxford Pascal also provides numerous extensions such as hexadecimal arithmetic and bit manipulation instructions.

Oxford Pascal in Education

In Education, Oxford Pascal is fast becoming a *de facto* standard. It is already the most popular Pascal on the Commodore 64, and will soon be released for the Spectrum and the Amstrad. In fact, Oxford Pascal will soon be available for 90% of the computers installed in the U.K., and is already available in German, French, Swedish, and American versions. Students and teachers alike find that it makes sense to use a standard implementation of Pascal across the whole range of educational micros. Call us for details of our generous educational discounts.

Resident and Disc Compiler

Oxford Pascal comes in two forms:

For Tape Users... Oxford Resident Pascal a compiler located largely in ROM which is available at any time. Programs can be written and compiled on the spot without disc or tape access, and compilation is fast enough to make using the compiler much like using the BASIC interpreter. Thus, learning Pascal is a simple interactive process. Some 15K of memory is available for user programs, the remainder being reserved for compiled object code.

For Disc Users... Oxford Disc Pascal offers all the above PLUS...a full disc compiler which is capable of using the WHOLE memory for Pascal object code, it is supplied with a powerful LINKER, allowing you to break large programming tasks down into separately compilable, easily-manageable files.

Manual

Both these compilers come with a manual which has been carefully designed, not only as a quick reference guide, but also as a full tutorial for those new to Pascal.

OXFORD



ISO
STANDARD

SPEED

TUTORIAL STYLE
MANUAL

FULL DISC
TO DISC
COMPILATION

Compilers like these

PASCAL

**EDITOR
EXTENSIONS**

**GRAPHICS
AND
SOUND**

**INTERACTIVE
RESIDENT MODE**

**FRIENDLY ERROR
REPORTING**



Oxford Computer Systems (Software) Ltd.
Hensington Road, Woodstock, Oxford OX7 1JR, England
Telephone (0993) 812700 Telex 83147 Ref. OCSL

Friendly Error Messages

Many compilers produce little more than an error and line number to help correct mistakes in Pascal programs. Oxford Pascal however, gives you one of 49 friendly and informative error messages, messages which not only indicate the reason for an error, but also print out the line in question with a pointer to the exact position where the error was detected. Run-time errors are reported using line-numbers from the original source-program with a full explanation of how the error occurred.

Powerful Editor

With Oxford Pascal there is no need for you to learn how to use a new Editor. Pascal programs can be entered in exactly the same way as BASIC programs, without the need to learn any new commands. When you are used to using Pascal, you will find our extensions to the Standard Editor even more useful. What is more, Oxford Pascal allows you to mix BASIC and Pascal together, in much the same way that you can mix BASIC and assembler. In fact you can, if required, mix all three together...BASIC, Pascal and assembler...in one program.

Stand Alone Code

Unlike other compilers, Oxford Disc Pascal allows you to compile on the BBC and then relocate your program so that it will run on the BBC and on the Electron. The relocated program will run without a Pascal ROM and can be loaded and run from tape or disc just like any other program.

This means that you can distribute or sell your software freely and without the need for ROMs, to run on either of the above machines.

Price/availability matrix

	BBC 'B'	ELECTRON	C64	SPECTRUM
DISC	£49.95	Not yet!	£49.95	Available April 1st 1985
CASSETTE	£39.95	£59.95 inc. Cartridge	£22.95	

All prices are inclusive of VAT Please add £2.00 for postage and packing.

Oxford Compilers — The Future

During the next year, we at Oxford will be releasing a series of language implementations such as C, and Modula 2, for the BBC, and other popular micros.

These compilers are being built, using the most modern techniques in automated compiler construction, and will bring to the micro-user, a level of robustness and efficiency, only now becoming available to mini and mainframe users.

Oxford...
the Compiler
Compilers.

Don't grow on trees

Oxford Pascal Order form. Please make cheques payable to OCSL Ltd.
Please rush me my copy of Oxford Pascal. I enclose £.....
My computer is BBC 'B' ☐ ELECTRON ☐ C64 ☐ (Please tick as appropriate)
I would like my compiler supplied on DISC ☐ CASSETTE ☐
Name.....
Address.....
Postcode.....
Telephone.....

THE UNIQUE MSX SYSTEM

Complete

In the confused world of computer technology the unique MSX System has been adopted as a common standard for computer production by at least 16 of the biggest and best names in home electronics. This major breakthrough in the development of

The Sensational SONY HIT BIT



A 64K MSX Computer with an exclusive, built-in Personal Data Bank (firmware). This handy facility enables you to enter, store, recall and up-date all kinds of personal information such as appointments, addresses, telephone numbers, etc. Operation is simple, with instructions appearing on the screen every step of the process.

£299.95

Data from the Personal Data Bank can be saved on any data storage facility or on the **UNIQUE HBI 55 RAM CARTRIDGE**, available for

£39.95

KV1430 14" MONITOR STYLE, PUSH BUTTON CONTROL TRINITRON COLOUR TELEVISION with front mounted RF terminal.

£239.95

HBD50 MICRO FLOPPY-DISK UNIT stores up to 360K bytes of information on a 3½" disk. Easily connected to the Hit Bit by using one of the expansion slots.

£349.95

The Superb SANYO MPC 100

This sophisticated piece of equipment offers all the advantages of 64K MSX computing. (complete with 4 programme starter pack)

£299.95

Plus a unique optional feature – **MLT001 LIGHT PEN**. This provides you with unlimited flair and flexibility in colour graphics design. This feature comes complete with a software package containing some intriguing graphic facilities.

**SAVE OVER
£100 ON AXIS
EXCLUSIVE SYSTEM
PACK
SEE NEXT PAGE FOR
DETAILS**

**MLT001
LIGHT PEN
£89.95**



**RING TELEDATA 01-200 0200 FOR DETAILS OF YOUR
ANYTIME DAY OR NIGHT**

NEAREST STOCKIST.

compatibility...

Home Computing brings you a complete compatibility in hardware and software. To cater for all home computing needs, Axis have selected in these pages an unbeatable, top value-for-money

range of MSX computers, colour monitors, peripherals and software for you to choose from. "We believe that when you discover the benefits of MSX computing no other system will do".

TOSHIBA

The Star Value TOSHIBA HX 10

The first MSX computer to be introduced into the U.K.

MSX

SAVE OVER
£115 ON AXIS
EXCLUSIVE SYSTEM
PACK
SEE NEXT PAGE FOR
DETAILS

PLUS SAVE £40
PLUS 3 YEAR GUARANTEE
PLUS 3 FREE SOFTWARE TITLES

SANYO

Offering superb facilities and outstanding value for the first time user or enthusiast. 64K Ram, 16 colour graphics, RF, video and audio connectors, plus ports for printer, disk drive and data recorder. (Including starter pack software).

ONLY £239.95
WAS £279.95

140E MONITOR STYLE COLOUR TELEVISION

The perfect partner for the HX10, providing excellent picture and sound quality.

£189.95

HX-P570 PLOTTER PRINTER

Easily connected to the HX10 through the printer interface. This printer features image and character plotting in 4 colours – red, green, blue and black – making it ideal for colourful graphs, pie and bar charts. Plotting speed is 285 steps per second.

£249.00

DR202 DATA RECORDER

Top of the range machine offering a host of high technology features.

£44.95

DON'T FORGET TO ASK YOUR DEALER FOR DETAILS OF CREDIT FACILITIES, EXTENDED GUARANTEES, ETC. AVAILABLE ON CERTAIN ITEMS.

AXIS
AT HOME WITH TECHNOLOGY

THE UNIQUE MSX SYSTEM

..amazing

When you buy your MSX computer, you enter a new dimension of Home Computing with software options on disk, ROM cartridge or cassette tape.

Peripheral options cover colour monitors, printers, disk

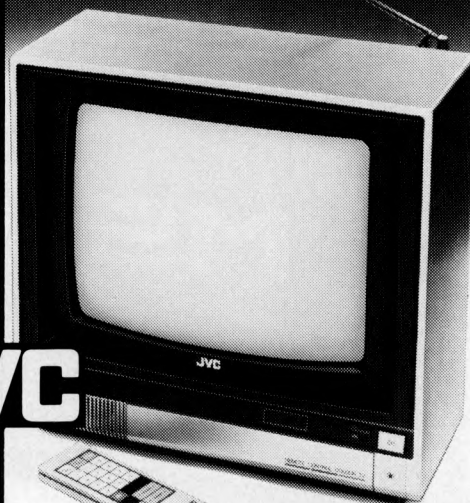
The Spectacular JVC HC-7GB

**RF, RGB &
COMPOSITE
OUTPUTS**

The HC-7GB personal computer from JVC is a new MSX machine designed for total compatability between other MSX machines and all MSX software. A highly advanced 64 K machine, the HC-7GB has three display modes offering RF, composite video and RGB outputs. The HC-7GB MSX personal computer from JVC is the final word in home entertainment.

£279.00

THE JVC 7255 GB 14" COLOUR TELEVISION COMPUTER MONITOR



With full
remote control

£269.95

JOYSTICKS

For extra versatility and sensitivity in control there is a range of high quality joysticks available from these famous manufacturers offering such features as double trigger and suction stability pads.



**SANYO
MJY 002 £12.95**

JVC HCJ615 £12.95



**TOSHIBA
HX-J400 £12.95**



SONY JS 55 £19.95

SONY ROM CARTRIDGE SOFTWARE

A range of sophisticated Sony Rom Cartridge Software is available at prices from

£17.95



**SANYO
DR201
DATA RECORDER**

An AC only recorder styled for computer use with all controls conveniently placed on top of the machine for ease of use.

£34.95



**SANYO
DR101 RECORDER**

Specifically designed for use with personal computers, with phase shift switch, speaker monitor and AC/DC operation.

£34.95

PRICES SHOWN INCLUDE VAT AND ARE CORRECT AT TIME OF GOING TO PRESS. E. & O.E.

**RING TELEDATA 01-200 0200 FOR DETAILS OF YOUR NEAREST STOCKIST.
ANYTIME DAY OR NIGHT**

versatility

drives, light pens, plotters, joysticks, data recorders and RAM cartridges from many top name manufacturers in the home electronics field.

Their performance offers you unrivalled graphic and sound quality together with outstanding simplicity of use.

Exclusive Axis System Deals*

SAVE OVER

£100**

**ON THIS
SUPER SYSTEM PACK**

SANYO MPC 100 Computer
SANYO SLIM 10 Data Recorder
SANYO MJY 002 Joystick
SAMSUNG BT309K B/w TV Monitor
PLUS £35 worth of software

£324.95

(normal Axis price £425.75)



SAVE OVER

£115**

**ON THIS
FABULOUS COLOUR SYSTEM**

TOSHIBA HX10 Computer
TOSHIBA 140E Colour TV Monitor
TOSHIBA HX-J400 Joystick
SANYO SLIM 10 Data Recorder
PLUS Assorted Software (value £9.95)

£399.95

(normal Axis price £517.75)



*Offers available only while stocks last **Saving refers to previous Axis advertised prices or recommended retail prices

SONY PRN-C41 PLOTTER/PRINTER

This Plotter/Printer produces red, green, blue and black images and characters. Pen replacement is easy and it takes a wide choice of paper sizes including

SONY FREE 'greetings pack' software. **£249.95**

SONY TCM737 DATA RECORDER

A mains or battery operated recorder ideal for use with your home computer. **£39.95**

JVC HC-R105 DATA RECORDER

The stylishly designed HC-R105 data recorder is an example of a machine produced to offer superb user convenience, exceptional performance parameters and reliable data transfer. The HC-R105 is a high speed machine giving very short access times to data. **£89.00**



RING TELEDATA 01-200 0200

For your local stockist or visit your nearest Axis recommended Dealer listed below

AVON	ESSEX	BURNLEY	STAFFORDSHIRE
BRISTOL C.J. FREEMAN & CO. LTD. 47, High St., Portishead Tel: 0272 848180	GRAYS A.C.L. RADIO SERVICES LTD. 1, Northmill Tel: 0375 4666	(TV CENTRE) 10, Howe Walk Tel: 0282 37118	STOKE-ON-TRENT ROY TOWNSEND SOUND & VIDEO 10, Trinity Street, Hanley Tel: 0782 289114
BEDFORDSHIRE	LEICESTERSHIRE	WIGSTON	STRATHCLYDE REGION
BEDFORD TAVISTOCK HI-FI LTD. 21, The Broadway Tel: 0234 56323	ILFORD D. WOOLMAN LTD. 76, Ilford Lane Tel: 01-478 1307	A.G. KEMBLE LTD. 63, Leicester Road Tel: 0533 881557	SALTCOATS HARRIS OF SALTCOATS 104-106, Dockhead Street Tel: 0294 64330
BERKSHIRE	LOUGHBOROUGH	STUART	SUFFOLK
SLOUGH C.F. LAKE LTD. 37, Stoke Road Tel: 0753 38287	WESTCLIFF HODGES & JOHNSON LTD. 96-98, Hamlet Court Road Tel: 0702 334488	WESTMORELAND 33, Cattlemarket Tel: 0509 230465	IPSWICH HUGHES TV & AUDIO 42, Buttermarket Tel: 0473 215093
READING SEWARDS 130-131, Friar Street Tel: 0734 599527	CHELMSFORD	LINCOLNSHIRE	LOWESTOFT HUGHES TV & AUDIO 62, London Road North Tel: 0502 85611
BRACKNELL SEWARDS 54, The Broadway Tel: 0344 52255	RUSH HI-FI 5-6, Cornhill Tel: 0245 57593	STUART WESTMORELAND 49, High Street Tel: 0476 78108	SURREY
BUCKINGHAMSHIRE	GRAMPIAN REGION	LONDON	DORKING DORKING AUDIO SYSTEMS 23, South Street Tel: 0306 882897
CHESHAM D.L. CHITTENDEN LTD. 59-61, The Broadway Tel: 0494 784441	ABERDEEN A & G KNIGHT 108, Rosemount Place Tel: 0224 630526	HOLBORN BERRYS RADIO 37-39, High Holborn Tel: 01-405 6231	WEST YORKSHIRE
CHESHIRE	GREATER LONDON	EALING SQUIRES OF EALING 28-30, New Broadway Tel: 01-567 1881	HOLMFIRTH FRANK PLATT ELECTRICAL Victoria House, 24, Victoria Street Tel: 0484 682036
NORTHWICH NORDIS LTD. 39, Chester Way Tel: 0606 3691	CROYDON J & T ROBINSON LTD. 20, Norfolk House, George Street Tel: 01-681 2800	MERSEYSIDE	HALIFAX FRED MOORE LTD. 15-17, Southgate Tel: 0422 67763
CREWE ROY TOWNSEND SOUND & VIDEO 2-4 Victoria Street Tel: 0270 213276	SUTTON LANDAU RADIO LTD. 195-197, High Street Tel: 01-643 0027	LIVERPOOL BEAVER RADIO 20-22, Whitechapel Tel: 051 709 9898	BINGLEY SPENCER & HILL LTD. 133, Main Street Tel: 0274 565161
CLEVELAND	HAMPSHIRE	NORFOLK	
STOCKTON ON TEES MCKENNA & BROWN LTD. 81, High Street Tel: 0642 679995	BASINGSTOKE SEWARDS 18, Paddington House, Bedford Walk Tel: 0256 65665	17-21, White Lion Street Tel: 0603 60935	
DERBYSHIRE	NORTH YORKSHIRE	NOTTINGHAMSHIRE	
DERBY STUART WESTMORELAND 67, St. Peter's Street Tel: 0332 367546	YORK CUSSINS & LIGHT LTD. Kings Square Tel: 0904 55666	NOTTINGHAM E.N.L. AUDIO VISUAL 116-118, Alfreton Road Tel: 0602 784015	
DURHAM	SOUTH YORKSHIRE	ROTHERHAM BRITANN BROS. LTD. Doncaster Gate Tel: 0709 65393	
DARLINGTON MCKENNA & BROWN LTD. 102, Bondgate Tel: 0325 59744	PRESTON GOODRIGHTS LTD. 1, Friargate Tel: 0772 57528		
EAST SUSSEX	BARNOLDSWICK HARRY GARLICK (TV CENTRE) 1, Church Street Tel: 0282 813309		
EASTBOURNE CLEARVIEW RENTAL 215, Seaside Tel: 0323 21646			
SEAFOUR CLEARVIEW RENTAL 34-40, High Street Tel: 0323 898989			

PLEASE NOTE "MSX" PRODUCTS ARE IN SHORT SUPPLY. PLEASE PHONE YOUR DEALER TO CHECK HE HAS STOCK AVAILABLE.

DON'T FORGET TO ASK YOUR DEALER FOR DETAILS OF CREDIT FACILITIES, EXTENDED GUARANTEES, ETC. AVAILABLE ON CERTAIN ITEMS.

AT HOME WITH TECHNOLOGY

DIRECT DISK SUPPLIES

OUR NAME SPEAKS FOR ITSELF

Bargain Box SALE

5.25" SSDD 48tpi FREE SEE10 Box (worth £1.99)	only £12.99
5.25" DSDD 48tpi FREE SEE10 Box (BRANDED DISKS)	£19.99
5.25" DSQD 96tpi FREE SEE10 Box (BRANDED DISKS)	£22.99
3" CF2 SSDD or CF2D DSDD Maxell disks.....	£39.99
3.5" Sony, Maxell, Fuji SSDD for Apricot, Mac etc.....	£37.99
3.5" Sony, Maxell, Fuji DSDD for Apricot, Mac etc	£49.99

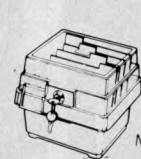
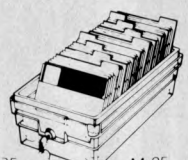
MANY OTHER BARGAINS & SPECIAL LINES

Normal postage & VAT apply

DDS VALUE FOR MONEY PRICES FAST DISK DELIVERY — CHEAPEST PRICES

DDS PRICE MATRIX

Easy pricing. Use the DDS Price Matrix for the right price first time.
Or DIAL-A-DISK, for firm quoted prices.

	3M			Verbatim® Datalife 5 year warranty			maxell®		
5.25" single sided disks	Code	1-9 boxes	10+ boxes	Code	1-9 boxes	10+ boxes	Code	1-9 boxes	10+ boxes
double density 48tpi	744	14.99	13.99	525	17.99	15.99	MD1-D	19.99	17.99
quad density 96tpi	746	22.99	20.99	577	24.99	22.99	MD1-DD	26.99	24.99
5.25" double sided disks	Code	1-9 boxes	10+ boxes	Code	1-9 boxes	10+ boxes	Code	1-9 boxes	10+ boxes
double density 48tpi	745	21.99	19.99	550	25.99	23.99	MD2-D	26.99	24.99
quad density 96tpi	747	26.99	24.99	557	32.99	30.99	MD2-DD	38.99	36.99
p&p per 10 disks		.75	FOC		.75	FOC		.75	FOC
8" diskettes	Code	1-9 boxes	10+ boxes	Code	1-9 boxes	10+ boxes	Code	1-9 boxes	10+ boxes
s'gle sided s'gle density	740.0	21.99	20.99	FD34-9000	25.99	24.99	FD1-128	25.99	24.99
s'gle sided d'ble density	741	29.99	28.99	FD34-8000	25.99	24.99	FD1-XD	28.99	27.99
d'ble sided d'bledensity	743.0	33.99	32.99	DD34-4001	30.99	29.99	FD2-XD	34.99	33.99
p&p per 10 disks		1.50	FOC		1.50	FOC		1.50	FOC
See-10 library box p&p per See-10 ABA lockable boxes M35 — 40 disks M85 — 80 disks p&p per ABA box (Carriage at cost on 3-9)	 SEE10	1.99 .75 13.99 16.99 1.75	1.75 .30 12.99 15.99 FOC	 M-35  M-85			 DIAL-A-DISK Order Hotline 01-541 1144 Answering service for out of hours orders		

Send for our free catalogue
We now sell Ribbons, Paper & Labels,
Magnetic Tapes and Rigid Media
Tenders & Quotes receive immediate attention

All offers and prices subject to change without notice.

Direct Disk Supplies Ltd., 29 Dagmar Road, Kingston, Surrey KT2 6DP

Prices per box of 10 disks excluding VAT

HOW TO ORDER:

1. Complete the coupon and post with your cheque using our FREEPOST address. A first class stamp gets it to us next day.
2. Urgent orders: DIAL-A-DISK 01-541 1144. Dictate your order with ACCESS or VISA and they're as good as received.
3. Collect from our office, phone and they will be waiting for you between 10.00 and 17.00 weekdays. (Other times by arrangement).
4. Next day delivery £7.50.
5. Crucial Orders: Same day delivery by quotation.
6. Official Orders: Orders from Government Departments, Local Authorities, Universities, Schools, etc, are very welcome and receive immediate attention.
7. Telex Orders: To 932905 (Larch G) attention LAN.

To: Direct Disk Supplies Ltd., FREEPOST, 29 Dagmar Road, Kingston, Surrey KT2 6BR.

PCW/3/85

Code	Qty	Description	Price

Name

Address

Postcode

Tel

Cheques payable to DDS. Debit my Access/Barclaycard No:

Signature:

Nett price

Carriage

Subtotal

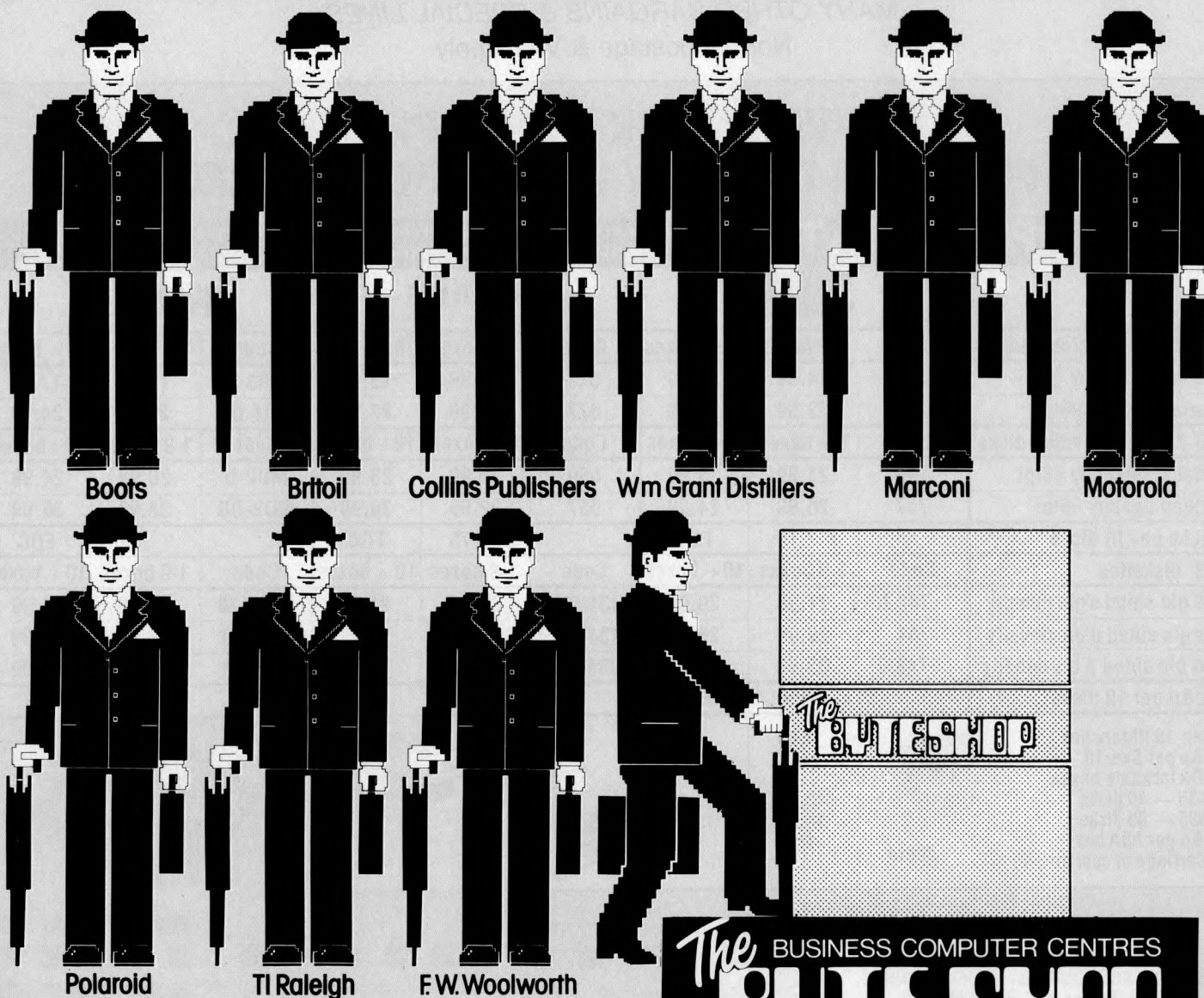
VAT 15%

Total payable to DDS

£



THE FIRST NAME BUSINESSMEN TURN TO FOR MICROCOMPUTERS



Businessmen like to look at all the options before they buy. Which is why their first step for business computing is the Byte Shop.

We've supplied the world's leading microcomputer systems and know-how to big business since 1977 – in fact we were the first IBM Authorised Dealers in the UK. So we don't have to manufacture reasons why you should buy a particular system.

We've the experience. The support staff. The service facilities. The training courses. And being nationwide we're close at hand.

We don't sell you a box, but an on-going partnership.

Whatever your needs turn to the Byte Shop, Britain's longest established, most respected microcomputer group. You'll be in very good company. Send off the coupon for our free brochure 'Where Can You Count on Getting the Right Business Computer?'

KI A Kode International plc Company

To: The Byte Shop Head Office, FREEPOST, Grove House,
Little Paxton, Cambs. PE19 4BR (No stamp required)

Please send me copies of your brochure.

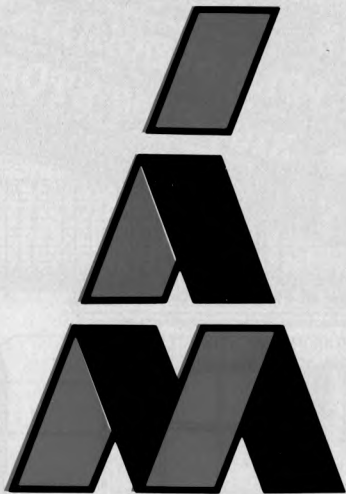
Name

Company

Position Tel:

Address

PCW



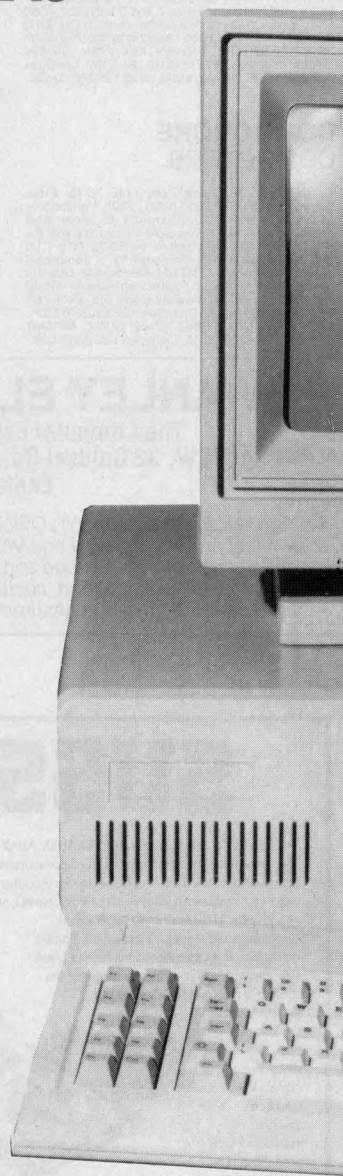
ABM COMPUTERS PRESENTS

A COMPLETE 16-BIT

FULLY IBM COMPATIBLE

**BUSINESS COMPUTER
SYSTEM**

FOR £1295 + VAT



**3 PORTABLE AND 2 DESKTOP
VERSIONS**

TWIN 320/360K DRIVES

WINCHESTER HARD DISK

OPTION

NETWORKING

COLOUR GRAPHICS

MEMORY EXPANDABLE TO

640K

12 MONTH WARRANTY

✂
**TO ABM COMPUTERS, HOLDERS RD,
ALDERSHOT, HAMPSHIRE GU12 4RH
TEL: (0252) 334282**

I WANT TO KNOW MORE!

NAME.....

CO NAME.....

ADDRESS.....

.....

.....

TEL NO.....

ORIC AND SINCLAIR COMPUTERS



Oric 1 computer 48K £85 (£82) £92. Oric Atmos computer 48K £171 (£158) £168. Oric colour printer £134 (£123) £140. Sinclair flat screen TV £113 (£105) £115. Sinclair Spectrum Plus Computer £182 (£176) £187. Sinclair QL Computer £406 (£385) £410. Sinclair Spectrum 48K £131 (£131) £143. Microdrive £51 (£50) £60. RS232 interface 1 £51 (£50) £60. Special offer: Microdrive + Interface 1 + 4 cartridges £102 (£100) £120. Blank microdrive cartridges £5.50 (£5) £7. Standard floppy disk interface for Spectrum £102 (£92) £112. (See Cumana disk section for suitable disk drives). Fuller FDS keyboard for Spectrum £52 (£52) £62. Fuller master unit £56 (£56) £62. Interface 2 £20.45 (£20) £24. 32K memory upgrade kit for 16K Spectrum (issue 2 and 3 only) £31 (£28) £30. Spectrum Centronics printer interface £51 (£47) £52. ZX printer has been replaced by the Alphacom 32 £71 (£69) £82. 5 printer rolls (State whether Sinclair or Alphacom) £13 (£16) £21. ZX81 computer £45 (£44) £54. 16K ram packs for Z81 £28 (£25) £30.

COMMODORE COMPUTERS

Commodore C16 Starter Pack £145 (£142) £162. Commodore Plus-4 £305 (£281) £301. Commodore 64 £222 (£215) £235. Converter to allow most ordinary mono cassette recorders to be used with the Vic 20 and the Commodore 64 £9.78 (£9) £11. Bargain package: cassette converter + compatible cassette recorder £37 (£38) £44. Commodore cassette recorder £43 (£44) £50. Printer interfaces for Vic 20 and the Commodore 64: Centronics £45 (£41) £46. RS232 £45 (£41) £46. Disk drive £233 (£209) £234. 1520 printer/plotter £165 (£149) £159. MPS801 Printer £235 (£220) £245. Light pen £29 (£29) £33.

SWANLEY ELECTRONICS

The Computer Export Specialists
Dept PCW, 32 Goldsel Rd, Swanley, Kent BR8 8EZ,
England

Tel: SWANLEY (0322) 64851. Official orders welcome. UK prices are shown first and include post and VAT. The second price in brackets is for export customers in Europe and includes insured airmail postage. The third price is for export customers outside Europe (including Australia etc) and includes insured airmail postage.

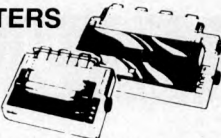
ACORN COMPUTERS

Electron £173 (£179) £199. BBC Model B £404 (£357) £387. Kenda double density disk interface system £149 (£131) £141. See below for suitable disk drives.

CUMANA DISK DRIVES

To suit disk interfaces of Sinclair Spectrum, BBC B and Videogenic. Single: 40 track single sided £176 (£158) £178. 40 tr double sided £218 (£195) £215. 80 tr ss £207 (£186) £206. 80 tr ds £234 (£209) £229. Dual: 40 tr ss £299 (£280) £320. 40 tr ds £395 (£353) £393. 80 tr ss £372 (£334) £374. 80 tr ds £437 (£390) £430.

PRINTERS



Ok! Microline 80 £138 (£135) £165. Brother HPS £162 (£146) £170. Shinwa CT1 CPA80 £237 (£228) £258. Cannon PW1080A £382 (£344) £374. Epson RX80 £277 (£251) £282. Epson RX80F/T £314 (£286) £316. Epson FX80 £399 (£358) £388. Combined matrix printers and electric typewriters: Brother EP22 £173 (£166) £186. Brother EP44 £258 (£235) £260. MCP40 Oric Colour printer/plotter £134 (£123) £140. Interfaces to run the above printers from Vic and the Commodore 64 £45 (£41) £46. We can supply interfaces to run the above printers from Sharp computers £58 (£52) £55.

UK101, SUPERBOARD AND VIDEOGENIE

We still support these Computers. Write for our list.

COMPUTER REPAIRS

We offer a world-wide repair service. Write for a quotation.

VITAL NEWS
LONDON'S APPLE SPECIALIST
HAS MOVED • BIG, NEW STORE
CALL TODAY...

STIRLING MICROSYSTEMS

If you're looking for advice on which computer system is right for your business a call to London's Apple specialist will put you right

STIRLING MICROSYSTEMS

THE BUSINESS COMPUTER STORE

231 BAKER STREET, LONDON NW1 6XE
TELEPHONE: 01-935 5262

OPEN MONDAY-SATURDAY 9.30 AM-6.00 PM

SUSS BOX

The DUPLEX SUSS-BOX and DUPLEX SUSS-ADAPTOR have been designed to enable the less skilled computer user to have a better understanding of the correct working connection between a computer and a peripheral, such as a printer. This is achieved by using the commonly used signals (wires) of the RS232C serial data cable specification, a matrix-block and special connector pins. By inserting the connector pins into the SUSS-BOX's matrix-block at the axis of

two incoming signals the user can quickly establish a firm connection. The signals are routed into the SUSS-BOX by two 25 way D type connectors; 1 x female, 1 x male. The SUSS-BOX also provides a lamp for each signal to show its condition when connected in line, ie High or Low.

SUSS ADAPTOR

When the user has achieved the correct Pin out between a micro computer and a printer the DUPLEX SUSS ADAPTOR should be used as a permanent means of connection. This is done by transposing the correct matrix block pin layout already established with the SUSS BOX onto the matrix block of the SUSS ADAPTOR and then installing the SUSS ADAPTOR in between the computer and printer.

SUSS BOOK (2nd edition)

If the user specifically wishes to connect a microcomputer to the OCTET or HERMIT typewriter/printer then refer to DUPLEX's SUSS BOOK for details on various microcomputer cable Pin outs.

£29.95
+ £1.00 p&p
+ VAT

DUPLEX
Communications
The Interface People

£6.95
+ £0.65 p&p

CWO only to:—
Duplex, 2 Leire Lane, Dunton Bassett, Nr Lutterworth, Leicestershire LE17 5JP
Tel: 0455 202154

PHONE Action line FOR

MATRIX PRINTERS

Mannesman Tally ■ NEC Pinwriter ■ OKI Microline ■ Epson ■ Digital
Dataproducts Paper Tigers

LETTER QUALITY AND LINE PRINTERS

Uchida ■ Dyneer ■ Brother ■ NEC Spinwriter ■ Dataproducts full range

VDUs AND MONITORS

Televideo ■ Tatung ■ Digital ■ Hazeltine ■ Dyneer

GRAPH PLOTTERS

Hewlett-Packard ■ Gould

PLUS A FULL RANGE OF COMPUTER FURNITURE

GET ON OUR
MAILING LIST—
HUNDREDS OF
GREAT BARGAINS
EVERY MONTH

MANCOS COMPUTERS

TRADE WAREHOUSE

Action line

01 840 5666 061 861 0757

TOP-LINE CHOICE / BOTTOM-LINE PRICES

Mancos Computers, Unit 3, Albany Road Trading Estate, Manchester M21 1BH

Cash & Carry COMPUTERS

PRINTER PRICES SLASHED

Personal callers welcome at our extensive showrooms most equipment on demonstration

Seikosha GP500A Dot Matrix Printer



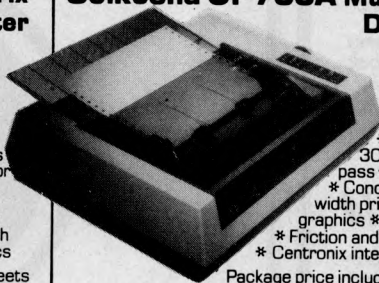
* 80 columns
* 50cps * Tractor
* Up to 10in.
* width
* Centronics interface
* Std and double width
characters * Graphics

Package price includes 100 sheets of paper plus printer cable or interface required.

available for the following computers:

Amstrad (text only) . . . £119.09 + VAT = **£136.95**
BBC, Oric, Dragon . . . £113.00 + VAT = **£129.95**
Sinclair
with Kempston I/F. . . £139.09 + VAT = **£159.95**
Sinclair QL . . . £130.39 + VAT = **£149.95**
MSX . . . £119.09 + VAT = **£136.95**

Seikosha GP700A Multi-colour Dot Matrix Printer



* 7 colours and
30 shades in one
pass * 80 columns
* Condensed & double
width print * Full colour
graphics * 50cps
* Friction and tractor feed
* Centronics interface

Package price includes 100 sheets of paper plus printer cable or interface required

available for the following computers:

BBC, Oric, Dragon . . . £243.43 + VAT = **£279.95**
MSX . . . £249.52 + VAT = **£286.95**
Amstrad . . . £249.52 + VAT = **£286.95**
Sinclair QL . . . £260.83 + VAT = **£299.95**
Sinclair
with Kempston I/F. . . £269.52 + VAT = **£309.95**

CBM MPS801 Dot Matrix Printer



* 80 columns
* 50cps * Tractor feed
* Up to 10in. paper width * Commodore
graphics * Std and double width characters * Plugs
straight into CBM64, VIC20, C16, Plus 4 and SX64

Package price includes 100 sheets of paper plus printer cable

£130.39 + VAT = **£149.95**

Commodore DPS1101

Daisy Wheel Printer (similar to Juki 6100)
compatible with all Commodore home computers
£304.30 + VAT = **£349.95**

The UK's Best Printer Prices

Juki 6100 (P) . . . £349.90 + VAT = **£402.39**
Brother HR15 (P and S) . . . £329.00 + VAT = **£378.35**
Daisystep 2000 (P) . . . £239.95 + VAT = **£275.94**
Brother M1009 (P and S) . . . £169.00 + VAT = **£194.35**
Brother HR5 (P or S) . . . £125.00 + VAT = **£143.75**
KAGAKP810NLQ (P) . . . £289.00 + VAT = **£332.35**
KAGAKP910NLQ (P) . . . £379.00 + VAT = **£435.85**
EPSON RX80 (P) . . . £195.00 + VAT = **£224.25**
EPSON RX80 FT PLUS (P) . . . £220.00 + VAT = **£253.00**
EPSON FX80 (P) . . . £324.00 + VAT = **£372.60**
EPSON RX100 FT (P) . . . £339.96 + VAT = **£390.95**
EPSON FX100 FT (P) . . . £430.00 + VAT = **£494.50**
(P)=Parallel-Centronics (S)=Serial RS232

Mail Order + Export + Trade

Hot Line Phone 01-686 6362

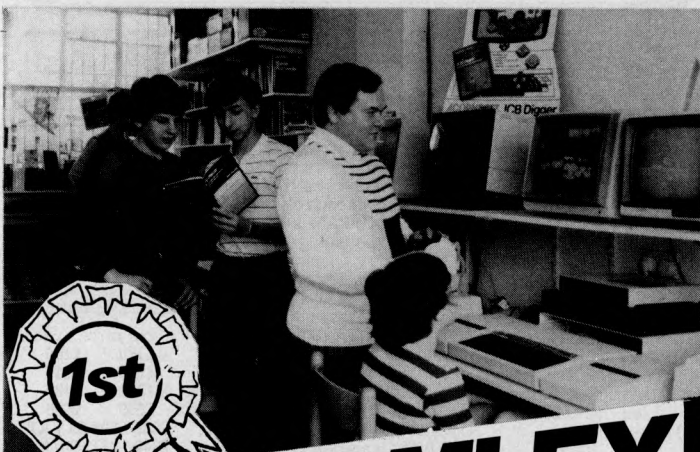
Delivery by Securicor (3 day) please add £5.00 + VAT per item.
Delivery by T.N.T. (overnight) please add £9.50 + VAT per item.

Order by 'phone quoting your Access,
Barclaycard No. Phone 01-686 6362. Immediate
despatch on receipt of order or cheque clearance.

Or you can Telex your order on:
946240 Attn 19001335

CASH & CARRY COMPUTERS

53-59 High Street,
Croydon, Surrey CR0 1BD.



1st IN BROMLEY

BROMLEY'S FIRST
SPECIALIST COMPUTER STORE

We are official Acorn Dealers with high standards to maintain and take pride in friendly and efficient advice and service.

See our extensive range of printers, monitors, disc drives, software and books.

Data Store

6 Chatterton Road, Bromley, Kent. 460 8991

EWART MICROSYSTEMS LTD SPECIAL INTRODUCTORY OFFER DISKS DISKS DISKS

SCOTLAND'S ONLY DISCOUNT DISK OUTLET

No nonsense, no gimmicks . . . just honest value and a no-quibble guarantee. Post & Packing Free in UK Mainland

Prices are per Box of 10 Disks

Number of boxes:	1-4	5-9	10-24	25-49	50 +	No.	Cost
BASF 5.25" Qualimetric Disks, with hub-ring reinforcement							
S/S S/D (48tpi)	£16.00	£15.00	£14.00	£13.25	£12.50		£
S/S D/D (48tpi)	£19.00	£17.75	£16.75	£15.75	£15.00		£
D/S D/D (48tpi)	£23.00	£21.75	£20.75	£19.75	£19.00		£
S/S Q/D (96tpi)	£24.00	£22.75	£21.75	£20.75	£20.00		£
D/S Q/D (96tpi)	£27.00	£25.75	£24.75	£23.75	£23.00		£
BASF 3.50" Microfloppy Disks							
S/S S/D:	£38.00	£36.75	£35.50	£34.75	£34.00		£

FOR 1st CLASS POST OPTION ONLY: total number of boxes: *****
additional postage @ 30p/box: ***** £

Total without VAT: ***** £
VAT at 15%: ***** £

REF: cm285

TOTAL PAYMENT ENCLOSED: ***** £

NAME:

TELEPHONE:

ADDRESS:

POST CODE:

ORDER BY POST ONLY, PLEASE

Overseas Orders welcome: do not add VAT; shipping at actual cost. Orders welcome from Government and Educational Establishments and PLCs — if you can't raise a cheque without an invoice, mail us your order and we'll send a pro-forma invoice your accounts department can pay against. Prices valid at time of going to press.

Please send cheque with order to:

EWART MICROSYSTEMS LTD

36 Queen Street, Helensburgh G84 9PU, Scotland

(If you don't want to cut this out, send order on separate sheet)

HISOFT

ULTRAKIT £9.45

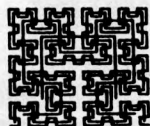
The most powerful toolkit yet for ZX BASIC. All the features you will ever need; AUTO insert, full RENUMBER, block DELETE, CLOCK, ALARM, error trapping, break trapping. Full TRACE with single-step and much, much more. Makes ZX BASIC easy-to-use and powerful.

DEVPAK £14

An excellent assembler, an advanced line-editor, a comprehensive disassembler and a superb 'front panel' debugger all in one package. Used by many leading software houses to write their games. "Buy it!" Adam Denning 1984.

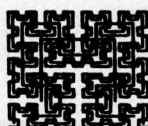
PASCAL £25

A powerful and almost full implementation of Pascal - not a Tiny Pascal. A valuable educational and development tool, programs typically run 40 times faster than a BASIC equivalent. Spectrum version includes Turtle Graphics package. "I haven't seen any other compiler that could match Hisoft's Pascal"



HISOFT

180 High Street North
Dunstable, Beds. LU6 1AT
Tel: (0582) 696421



HISOFT



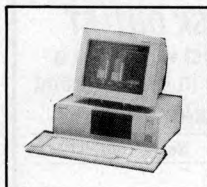
for the ZX Spectrum

Hisoft is pleased to announce a new compiler for this popular and effective systems programming language. Not a tiny-C but an extensive, easy-to-use implementation of the language. Allows direct execution of compiled statements. Supplied with function library. Available direct from Hisoft for £25, or write for further details.

All prices, UK delivered, relate to 48K ZX Spectrum versions. Our software is available for many other Z80 machines e.g. Amstrad CPC 464, MSX, Memotech, SHARP MZ700, New-Brain, CP/M etc. Please write for details.

· VALUE · VALUE · VALUE ·

ERICSSON



THE IBM
COMPATIBLE
P.O.A.

The recently launched ERICSSON PC is now available from Wolfcrown. It is exceptionally IBM compatible with extra features at a significantly lower price. On site 12 months warranty included with nationwide Ericsson backup. Standard configuration includes 128Kb, serial and parallel ports, six expansion slots, ergonomic amber monitor and splendid graphics. According to PC USER "At 90% of whatever the current price of the IBM PC happens to be, its an index linked bargain."

PC MULTI-USER BOARD

Why network when you can transform your PC into a multi-user Alpha system supporting up to three screens. Fit the sensational Alpha Micro 170 board into your PC and it operates as a multi-user Alpha Micro PC with access to MS-DOS. On board 128Kb memory, clock/cal, MC68000 processor and full AMOSL operating system and facilities.

£1,500+ VAT

ALPHA MICRO

MULTI-USER 10Mb WINCHESTER
MULTI-TASKING VCR BACKUP
UP TO SIX USERS SOFTWARE INC.

The AM1000, the smallest machine in the range is based on the MC68000 and supports two users, expandable up to six, and is available in various configurations up to 40Mb and 1024Kb RAM memory. We are offering a 10Mb system with two word processing screens, operating system, BASIC language Assembler, word processing, over 150 utilities, and accounting software at the remarkable price of £7,250. Extra users can be added at £650 per user.

IBM COMPATIBLE PC'S

PC-301 £1,395+ VAT

IBM PC compatible with 2x360Kb floppy drives, colour video board and expandable 128Kb multifunction card, 2 serial ports, parallel port, clock/cal and eight expansion slots.

TOSHIBA PC from £1,795+ VAT

The new TOSHIBA PC offers IBM compatibility with a higher specification and bundled software with a value of £700 including Peachpak, wp, spreadsheet etc. 192Kb RAM standard, parallel and serial ports.

IBM PC BOARDS

Hercules graphics card £315+£47.25 VAT
SIGMA multifunction card £245+£36.75 VAT
64Kb to 384 Kb RAM, serial/parallel ports, games port, clock/calendar etc.

PRINTERS & MONITORS

SMITH-CORONA PRINTERS	our price	RRP
Fastext 80.80 col/80cps dot matrix	£170	£195
D100 80 col/120cps dot matrix	£220	£249
D200 80 col/160cps, NLQ, dot matrix	£375	£420
D200 132 col/160cps, NLQ, dot matrix	£535	£595
Daisystep 2000 20cps daisywheel	£239+£35.85 VAT	
JUKI 6100 18cps daisywheel	£340+£51.00 VAT	
CP80 80cps dot matrix	£179+£26.85 VAT	
Riteman Slim-line printer 120cps	£209+£31.36 VAT	
Philips 12" Green monitor	£79+£11.85 VAT	

APPLE COMPATIBLE PRODUCTS

Slim-line disk drive	£125+£18.75 VAT
Z80 card	£39+£5.85 VAT
80a column card	£45+£6.75 VAT
Printer card and cable	£45+£6.75 VAT
Disk controller card	£35+£5.25 VAT

Full range of APPLE cards in stock, phone for prices

TO ORDER

Please telephone order particulars to 01-629 3603 or visit our West End offices on the 1st Floor at 58 Jermyn Street, London SW1Y 6LX.
Dealer enquiries are welcome.

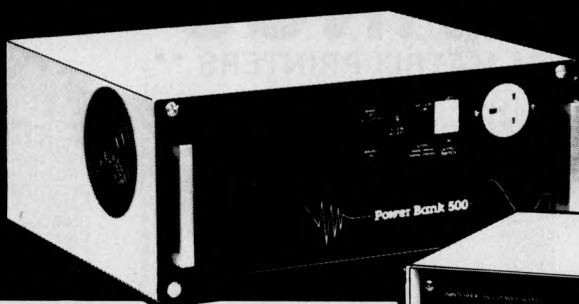
1st FLOOR, 58 JERMYN STREET, LONDON SW1Y 6LX · TELEPHONE 01-629 3603

· WOLFCROWN ·

ALSO AT PRINCE GROUP, LOMBARD HOUSE, GREAT CHARLES STREET, BIRMINGHAM · TELEPHONE 021-233 2286

Would you like to have Power?

While all
the rest
are in
the dark.



Meet the
**POWER
BANKS**

THE UNINTERRUPTIBLE POWER SUPPLY systems

that are the complete answer to ALL of your problems!

With the POWER BANK "BLACK OUTS" will not affect the operation of your computer system.

Micro Systems, Networks, Hard Disks, Printers, Telephone Exchange, Data Transmissions etc.

- * Output derived constantly from self contained sealed for life batteries.
- * Sine wave shaped output – voltage and frequency closely regulated.
- * Genuine "NO BREAK" unit with continuous output ratings of 500-250 & 120VA.
- * Much more than a "spike and surge" suppressor.
- * Far superior to a voltage stabilizer.
- * Overload and short circuit (output) indication and protection.
- * Bench or rack mounting (500VA).
- * Battery level monitored – mains on – mains off indication.

could you bank on that much power?

MANUFACTURED BY:

POWER TESTING (UPS) LIMITED

23 Tallon Road, Hutton, Brentwood, Essex CM13 1TE Tel: Brentwood (0277) 233188. Telex 24224 MONREF 586



FANTASTIC NEW YEAR OFFER – The outstanding

datasafe™

diskettes – direct from our warehouses

The diskettes of the future — super full 3-year no-quibble exchange guarantee. All units tested to stringent standards offering uncompromising value. Suitable for use on all types of 5¼" and 8" floppy disk drives.

LOOK AT OUR PRICES

Order Code	5¼"	Box of 10	1 Pack	2 Pack	3 Pack
511-0	SS/SD	9.90	1.70	2.90	4.15
512-0	SS/SD	10.25	1.80	3.05	4.40
522-0	DS/DD	14.90	2.15	3.85	5.50
514-0	SS/QD	16.25	2.25	4.00	5.75
524-0	DS/QD	19.75	2.60	4.70	6.80

Order Code	8"	Qty Discounts (No of diskettes)
811-0	SS/SD	15.70
812-0	SS/SD	18.50
821-0	DS/SD	16.80
822-0	DS/DD	21.80

ALL PRICES
CWO EXCL. VAT
PROMPT DELIVERY

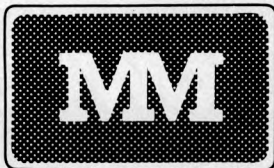
Postage charge
60p per box
30p per pack

*Datasafe is the
Trade Mark of
Samleco International Ltd

Post to:
Mail-A-Disk,
FREEPOST,
Hyde Heath,
Amersham,
Bucks HP6 5BR
Tel: 02403 4536

Name:
Telephone:
Address:
Signature:
My Access No. is

ORDER CODE	QTY	BOX	PACKS 1 2 3	PRICE EACH	TOTAL
TOTAL					TOTAL 1
					Less discount (if appl) — %
					TOTAL 2
					VAT @ 15%
					POSTAGE
					CHEQUE/PO VALUE



UNBELIEVABLE SAVINGS

** COMPUTERS **

	EX VAT
APRICOT F1 - from	£775.00
APRICOT Point 7 from	£2950.00
APRICOT PORTABLE from	£1495.00
APRICOT 256K 315Kx2 MONITOR	£1395.00
APRICOT 256K 720Kx2 MONITOR	£1545.00
APRICOT Xi 256k 10MB MONITOR	£2195.00
BBC B	£320.00
CIFER 9000 Multi User 21MB	£5095.00
COMMODORE 8250 DISK DRIVE	£785.00
COMMODORE 8296	£695.00
COMMODORE SX-64 PORTABLE	£675.00
COMMODORE 64	£156.51
COMMODORE DISK 1541	£165.21
COMMODORE PARALLEL INTERFACE	£59.50
COMMODORE 1530 C2N CASSETTE	£32.00
COMPAQ2 2X360K	£1795.00
COMPAQ Plus(10MB)	£3195.00
IBM PC List less 17.5%	PHONE
OLIVETTI M20 160KB 2x320KB Drives	£1295.00
OLIVETTI M24 128KB 2x360KB Drives	£1575.00
OLIVETTI M24 128KB 10MB Hard Disk	£2695.00
SAGE II & IV	POA
SANYO MBC555 128K 2x160K Drives	£795.00
SIRIUS 256K 10MB	£2850.00
SIRIUS 256K 2.4MB	£2095.00
SIRIUS 128K 1.2MB	£1645.00
ACT/IBM Memory Expansions from	£222.00
PLUS 5 External Hard Disk Drives	POA

** SOFTWARE **

ALL MAJOR SOFTWARE PROGRAMS SUPPLIED AT LOW COST

D BASE III	£360.00
WORDSTAR	£195.00
OPEN ACCESS	£360.00
LOTUS 123	£295.00
SYMPHONY	£420.00
MULTIMATE	£240.00
D BASE II	£230.00
DMS DELTA	£395.00
FRIDAY	£135.00
FRAMEWORK	£345.00

Not only do we offer top quality products at low prices. We also support and develop Software with the assistance of our long established software dept. NEW RELEASE — UNIX MULTI USER ACCOUNTS SOFTWARE.

** MATRIX PRINTERS **

	EX VAT
ANADEx DP-6500 500cps	£2234.00
ANADEx WP-6000	£1961.00
BROTHER EP44	POA
BROTHER HR5	POA
BROTHER M1009 50cps	£159.00
CANON PW1080A 160cps(NLQ)	£299.00
CANON PW1156A 160cps(NLQ)	£379.00
EPSON RX 80T 100cps	POA
EPSON RX 80F/T 100cps	POA
EPSON FX 80 160cps	POA
EPSON FX 100F/T 160cps	POA
EPSON LQ 1500 200cps(NLQ)	POA
HONEYWELL From	£375.00
MANNESMANN MT80 80cps	£177.00
MANNESMANN MT180 160cps(NLQ)	£579.00
NEC PINWRITER P2(P)(NLQ)	£535.00
NEWBURY DRE 8850 300lpm	£2065.00
NEWBURY DRE 8925 240cps	£1385.00
OKI 84A 200cps	£625.00
OKI OKI92P 160cps	£360.00
OKI OKI2410P 350cps	£1535.00
OLIVETTI DM4100E 120cps	£520.00
PANASONIC KP1091 120cps + NLQ	£249.00
SHINWA CP80 Model II FT	£165.00
STAR DELTA 10 160cps	£299.00
STAR DELTA 15 160cps	£399.00
STAR GEMINI 10X 120cps	£189.00
STAR GEMINI 15X 120cps	£269.00
STAR RADIX 10 200cps(NLQ)	£419.00
STAR RADIX 15 200cps(NLQ)	£525.00
TOSHIBA TH2100H 192cps	£1275.00
TREND 930 200cps NLQ 80cps	£1350.00

MAYFAIR MICROS

BLenheim HOUSE, PODMORE ROAD, LONDON SW18 1AJ

TEL: 01-870 3255 / 871 2555

We accept official orders from UK Government and Educational Establishments. Mail Order and Export Enquiries welcome. Callers by appointment.

** DAISYWHEEL **

** PRINTERS **

	EX VAT
BROTHER HR1	POA
BROTHER HR15	POA
BROTHER HR15 Keyboard	POA
BROTHER HR15 Sheetfeeder	POA
BROTHER HR25	POA
DAISYSTEP 2000 20cps	£219.00
DIABLO 630 API	£1295.00
DIABLO Sheet Feeder	£490.00
FUJITSU SP320 48cps	£795.00
JUKI 6100 18cps	£325.00
NEC 2010 Serial 20cps	£545.00
NEC 2030 Parallel 20cps	£545.00
NEC 3510 Serial 35cps	£1049.00
NEC 3530 Parallel 35cps	£1049.00
NEC 7710 Serial 55cps	£1440.00
NEC 7730 Parallel 55cps	£1440.00
OLIVETTI DY450 45cps	£880.00
QUME 11/40 RO	£1185.00
QUME 9/45 RO	£1550.00
QUME LETTERPRO 12/20	£475.00
RICOH RP1300S	£895.00
RICOH RP1600S	£1175.00
RICOH RP1600S FLOWWRITER 8k	£1249.00
RICOH RP1600S FLOWWRITER 8k	£1249.00
IBM PC	£1299.00
RICOH RP1600S Sheet Feeder	£459.00
RICOH RP1600S Tractor	£138.00
SMITH TP1 12cps	£154.00
CORONA STARWRITER F1040 40cps	£895.00
TEC STARWRITER F5055 55cps	£1235.00
TEC Sheetfeeder	£459.00
TEC Tractor	£138.00

** VDU's & TERMINALS **

CIFER T4	£760.00
HAZELTINE ESPRIT Fixed Keyboard	£395.00
QUME QVT 103(VT100 VT131)	£695.00
TELEVIDEO 910	£489.00

* MEMORY EXPANSIONS *

AST, HERCULES, QUADRAM, SIMONS ALL AT BIG SAVINGS

POA

The complete computer store...

Word Processing ■ Communications ■ Data Management ■ Business systems

Consultancy

Installation

Training

Support

Business and Professional Systems
(0223) 65334/5

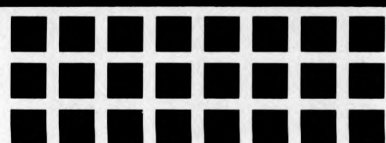
Engineering Support Group
(0223) 316045

Home and Educational Computing
(0223) 358264

Communications, Electronics, Supplies
(0223) 68155



Sinclair Tandy EPSON KAYPRO SANYO



Cambridge Computer Store

1 & 4 Emmanuel Street, Cambridge CB1 1NE

News from the world of
Sinclair QL computing.

QL

NEWS



One year old... and look how we've grown!

When we launched the QL last year, we knew we were starting a revolution.

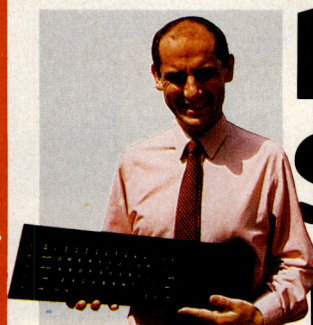
For the first time, the serious computer hobbyist could afford the same power and performance as the professional computer user.

A year later, and the QL is more than a unique computer, it's the heart of a unique system.

And the next 12 months promise even more for QL owners... new software options, extra storage devices, printers, monitors...

Read on, and see how far we've come, and how much further we're going!

Nº1



NIGEL SEARLE

Now it's the quantum leap for QL software and peripherals

Without doubt, the QL was the computer innovation of 1984. Launched to outstanding reviews, it soon gathered thousands of happy owners, and recognition from people like ICL, who have incorporated QL technology and its Microdrives into the new One Per Desk.

The quickest glance at the QL's specification shows what the fuss was all about... 128K RAM, 32-bit processor architecture, 200K built-in mass storage, bundled software. They're features that would normally cost you three or four times as much!

But that's only half the story, because the QL is now the heart of a computer system, with a growing library of software...

As you'll see from these pages, 1985 is the year of the quantum leap for software and peripherals. Already there are no less than five QL languages together with special programs for software developers, a world-beating chess game... and much more on the way!

On the hardware side, there's a special QL monitor to make the most of that high-resolution 512 x 256 pixel display. There

are memory expansion boards, Winchester disk drives, printers, and low-cost Microdrive cartridges.

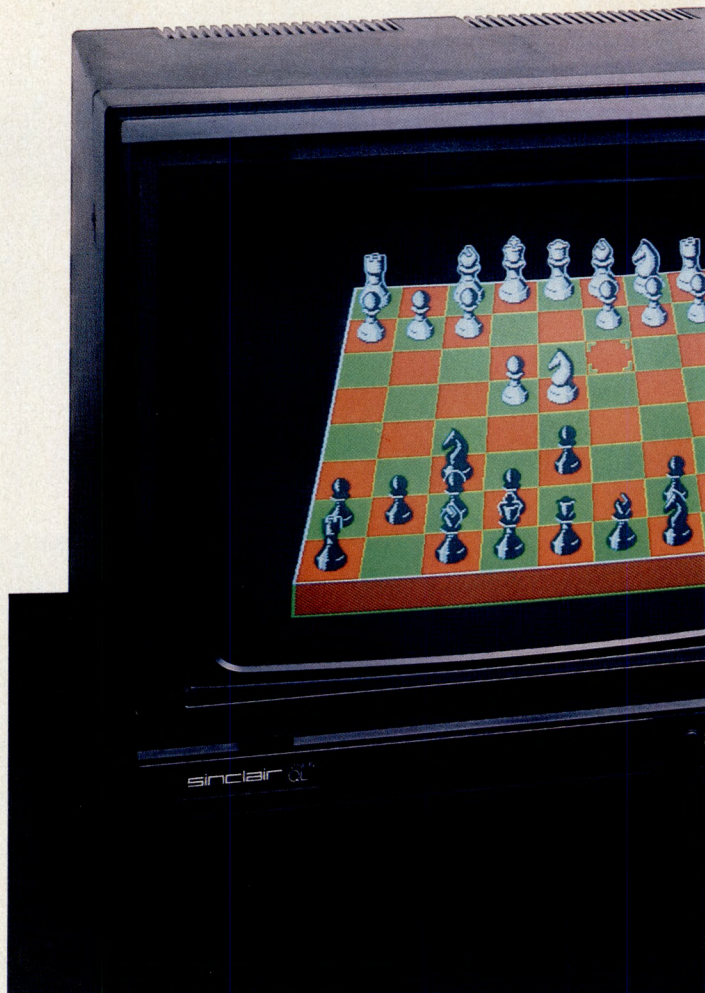
In fact, there's so much going on, we'll be running these regular Newsletters just to keep you in touch!

If you already own a QL, the next few pages will give you a taste of the exciting year ahead.

And if you don't... take a look at what you're missing. It should be all the persuasion you need!

Now read on...the quantum leap into serious computing starts here.

Nigel Searle, Managing Director, Sinclair Research Limited.



From sophisticated business packages to superb animated games... QL software makes the most of the computer's extraordinary specification.

New QL Software

Utilities, languages, games and business packages...with more on the way!

Two things are now certain about QL software. First, there's going to be plenty of it. And second, it's going to set completely new standards for microcomputers...

At the moment, there are well over 100 software programs in development. And the first

software releases, shown here, demonstrate how exceptional the best QL software will be.

The QL already has five languages, superb programs for software developers, a top quality accounting package and in QL Chess it has its first game.

QLUB: 10,000 members and growing!

QLUB is the special Users Bureau for Sinclair QL owners. There are now well over 10,000 QLUB members, and membership is growing all the time.

For their annual subscription of £35, QLUB members are enjoying a whole range of information and advisory services, exclusive offers and special discounts.

One of the most important QLUB benefits is the special news magazine, appearing six

times a year. The magazine provides a forum for QL owners to exchange views and keep in touch with all the latest developments.

Each issue is packed with updates on QL hardware and software, tips on applying the four QL Programs, and news of how other people are using the QL. QLUB members also receive a range of special discounts, with savings of at least 20% on selected software products.

Current special offers include:
QL Chess for £14.95
QL Toolkit for £19.95

QL Assembler for £31.95
QL Cash Trader for £54.95
Special subscription rates for Personal Computer News and QL User.





The multilingual Sinclair QL

BCPL – a forerunner of C, BCPL has been described as a systems programmer's delight. In the words of QL User, this compiler is a 'brilliant compromise between a high-level language and a low-level systems language'. Whilst not for beginners, this is an essential buy for anyone with a good knowledge of systems programming. Complete with manual.

Available from
Metacomco – £59.95.

Tel: 0272 428781.

LISP – already well-known for its artificial intelligence appli-

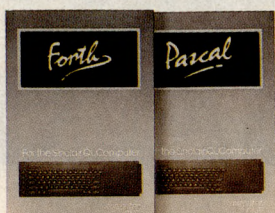
cations, LISP is a powerful and versatile language. This is a sophisticated implementation of LISP, by one of its leading exponents, Dr Arthur Norman. This package features full QL graphics, and a full manual is supplied.

Available from
Metacomco – £59.95.
Tel: 0272 428781.



Pascal – probably the most popular high-level language of all. Pascal is particularly well-suited to structured programming sophisticated data manipulation and algorithmic problems. Pascal interpreter complete with 87-page manual.

Available from
Computer One – £39.95.
Tel: 0223 862616.



Psion trouble-shooting service

All QLUB members can obtain special assistance from Psion on using the QL Quill, Abacus, Archive and Easel programs supplied with the computer. Psion will normally answer any queries within 48 hours.

Forth – this 'new generation' language is proving both popular and easy to learn. The program provides a full implementation of the latest Forth 83 standard with graphics and sound extension.

Available from
Computer One – £29.95.
Tel: 0223 862616.

APL – the compact mathematics-based interpreted language designed for scientists and mathematicians.

APL keyword interpreter complete with manual.

Available from
MicroAPL – £99.95.
Tel: 01-622 0395.

Programmer's packs

QL Assembler – two programs operating in tandem. The first is a full-screen editor for creating and altering program files. The second, a Motorola-format compatible 68000 assembler which converts source files written in M68000 assembly language into machine code files which can run on the QL.

Both assembler and editor are written in machine code and can be multi-tasked with SuperBASIC, so you can switch

between editor, assembler and SuperBASIC instantly.

Written by GST Computer Systems – £39.95.*

QL Toolkit – a programmer's toolkit with over 70 programs, and extensions to SuperBASIC. Most are linked to SuperBASIC initially and can then be used from commands or from within a program. Enhancements include printer spooling (print a file while running a SuperBASIC program); improved file access (with full random input/output command); job control (allows management of multi-tasking programs including the ability to display, alter priorities, and delete jobs from the QL); and SuperBASIC screen editor.

Written by Q Jump – £24.95.*

World-beating chess!

QL Chess – fresh from its victory at the World Microcomputer Chess Championship. This program sets a completely new standard for games software.

There's a high resolution display, animated 3-D graphics, and 28 levels of play from novice to champion. Features include an openings book of nearly 4000 moves, HINT and TAKEBACK functions that help you learn from your mistakes, and the option to play a human opponent or the computer.

Written by Psion – £19.95.*

Software at work

QL Touch 'n' Go – a unique approach to learning touch-typing skills. The program is designed to give you mastery of the standard QWERTY keyboard in just 24 hours. With practice, you should soon reach 40 words per minute, with over 95% accuracy.

Written by Harcourt – £24.95.*

QL Cash Trader – a unique computerised book-keeping system for small businesses. The program provides a complete course in the principles of accountancy, and goes on to become an essential aid in the day-to-day running of a business. Complete with comprehensive manual.

Written by Accountancy Software of Torquay – £69.95.*

This title is available from
Sinclair Research on
0276 686100, and selected
Sinclair stockists nationwide.

New QL Hardware

An industry is born

From the moment of its launch, the revolutionary QL attracted massive interest from all quarters.

In one area, the interest quickly turned to action, as high-tech hardware manufacturers realised the immense potential of the QL for vast expansion, for system development and for

widespread networking. Already the list of peripherals for the QL is very exciting – and lengthening by the day!

Here, we've covered many of the latest, most important developments.

As more appear, be sure to keep in touch with QL News!



The dedicated Sinclair Vision QL monitor

Once you see the incredible graphics capabilities of the QL you may decide an ordinary TV just can't do them justice.

If that's the case, a high-resolution monitor is needed. (And if you're creating presentation-quality charts, for example, it's quite essential.)

The new Vision QL monitor is specially designed for the computer by Kaga Electronics, with full support from Sinclair Research.

So it exploits the QL's maxi-

mum 512 x 256 pixel resolution to the full, with a pin-sharp 85 column display.

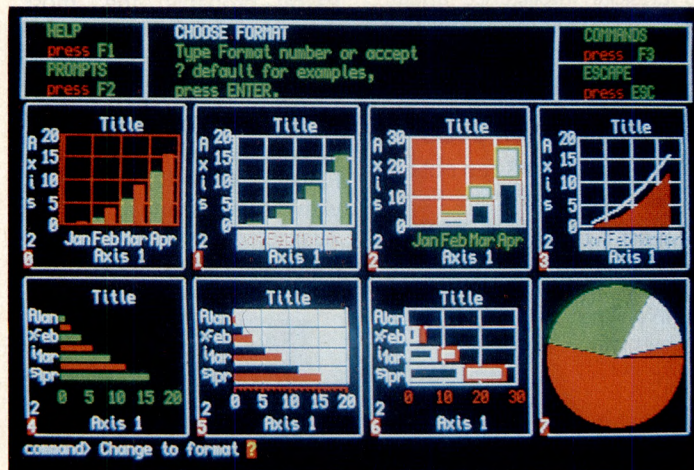
It's also specially styled to suit the QL – in looks, and in use. There's a 12" non-glare tube, and etched screen to diffuse reflections.

So the display is bright, sharp, *much* easier to look at... and invaluable for those late-night programming sessions!

And like the QL, the Vision monitor is designed with space in mind: it has a compact foot-

print of just 12½" by 15" – no more than a typical portable typewriter.

It's available from MBS Data Efficiency on 0442 60155 and selected Sinclair stockists.



Microdrive cartridges. Another Sinclair first!

Microdrive cartridges are the QL's own unique storage media. Each stores up to 100K of information, on a cartridge no

bigger than a matchbox!

Access is within seconds. And in tests, Microdrive cartridges have made over 50,000 passes

without loss of data.

Over 500,000 cartridges are now being used throughout Britain. And QL Microdrives themselves are standard equipment on the new ICL One Per Desk.



Sinclair Microdrive cartridges – up to 100K of programs and data on a medium so compact you can pop it into your pocket.

Powerful hard-disk system

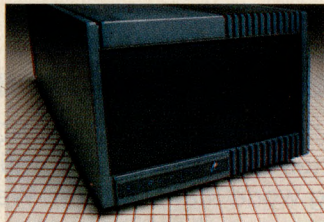
For the QL business user, the new Firefly QL Winchester disk will boost the QL's power in one huge leap.

Designed by Quest, it uses CP/M and offers all the benefits of Winchester technology: fast access, reliability, compact size and quiet operation.

With 7.5 Mb storage, the Quest Firefly is ideal for large databases such as stock or cus-

tomers lists. And at under £1,200, it represents exceptional value for money.

The Firefly will be available very shortly from Quest on 04215 66488.



Winchester hard disk drives supplement your QL's built-in mass storage.

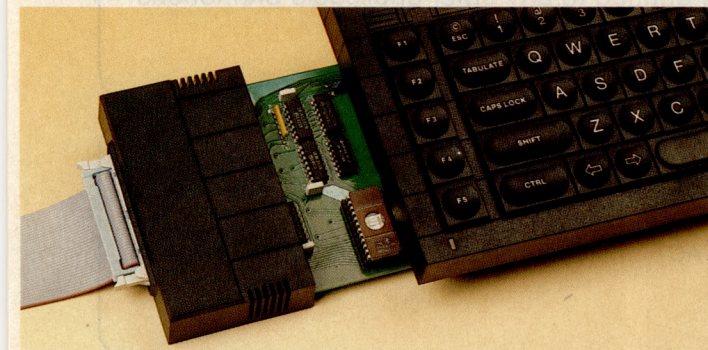
Interface options

The QL comes complete with two built-in RS-232C interfaces.

In addition, interfaces for Centronics printers are widely available from manufacturers such as CST, Miracle Systems and Sigma Research . . . with

prices from only £35.

And that's just the beginning. For attaching scientific and laboratory instruments to the QL, CST even offer an IEEE-488 interface, which can handle up to 16 connected devices simultaneously!



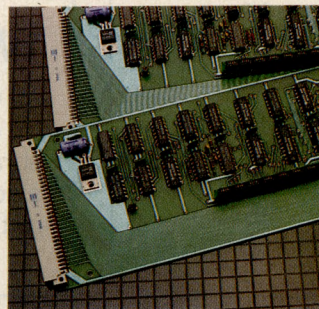
A Centronics interface slips discreetly into place.

Expansion boards for up to 4 times more memory!

Also from Quest, a simple and inexpensive way to expand the QL's RAM: with memory expansion boards.

These compact units connect to the standard QL expansion port, using the QL's internal power source or, for larger boards, an external power source.

The units range from 64K and 128K RAM boards to massively powerful 256K and 512K RAM boards, so there's something for every user.



Compact expansion boards.

Prices start at £117, and the 512K board is a very cost-effective investment at just £587.

With affordable memory like this, the QL is more than a match for any other micro under £2,000!

The spec behind the spectacle

CPU – Central Processing Unit

Fast, powerful Motorola 68008 chip. A second processor, an Intel 8049, controls the keyboard, generates the sound, and acts as an RS-232C receiver.

RAM

128K. Now expandable to 640K.

ROM

48K.

Operating system

Qdos – revolutionary single-user, multi-tasking windowing operating system.

Storage

Twin built-in QL Microdrives. Up to 100K storage each – transfer rate, up to 15K per second.

Keyboard

Full moving 65-key QWERTY, five function keys, four cursor keys.

Language

Sinclair structured SuperBASIC.

Application software

QL Quill – word processor
QL Abacus – spreadsheet
QL Easel – graphics
QL Archive – database

All four packages supplied with the QL.

Interfaces

Two serial RS-232C interfaces, Microdrive expansion port (up to 6 may be added), ROM cartridge port, local area network, 2 joystick ports, RGB monitor and TV output.

Text screen

Various modes – up to 85 columns by 25 rows on monitor. On TV, up to 60 columns.

Graphics resolution

512 x 256 pixels (four colour), 256 x 256 pixels (eight colour).

Sinclair Research Ltd

Camberley, Surrey, GU15 3BR.
Tel: Camberley (0276) 686100.

sinclair

Where to find the QL. The Sinclair QL is available at selected branches of Dixons, W H Smith, John Lewis Partnership, Currys, Greens in Debenhams and Ultimate, and larger branches of Boots, John Menzies and specialist computer stores nationwide.

Sinclair, QL, QLUB, and Qdos, are trademarks of Sinclair Research Ltd. Quill, Easel, Archive and Abacus are trademarks of Psion Ltd. Due to our policy of continual product improvement, Sinclair Research Ltd reserve the right to alter specifications at any time.



COLOURED DISKETTES

Part Numbers

5.25" Red Diskettes

R1/D S/Sided D/Density 48 tpi
 R2/D D/Sided D/Density 48 tpi
 R1/DD S/Sided D/Density 96 tpi
 R2/DD D/Sided D/Density 96 tpi

5.25" Orange Diskettes

O1/D S/Sided D/Density 48 tpi
 O2/D D/Sided D/Density 48 tpi
 O1/DD S/Sided D/Density 96 tpi
 O2/DD D/Sided D/Density 96 tpi

5.25" Yellow Diskettes

Y1/D S/Sided D/Density 48 tpi
 Y2/D D/Sided D/Density 48 tpi
 Y1/DD S/Sided D/Density 96 tpi
 Y2/DD D/Sided D/Density 96 tpi

5.25" Green Diskettes

G1/D S/Sided D/Density 48 tpi
 G2/D D/Sided D/Density 48 tpi
 G1/DD S/Sided D/Density 96 tpi
 G2/DD D/Sided D/Density 96 tpi

5.25" Pale Blue Diskettes

P1/D S/Sided D/Density 48 tpi
 P2/D D/Sided D/Density 48 tpi
 P1/DD S/Sided D/Density 96 tpi
 P2/DD D/Sided D/Density 96 tpi

5.25" Blue Diskettes

B1/D S/Sided D/Density 48 tpi
 B2/D D/Sided D/Density 48 tpi
 B1/DD S/Sided D/Density 96 tpi
 B2/DD D/Sided D/Density 96 tpi

General Prices

EXC VAT

All Colours	1-9	10-19	20+
1/D	12.90	11.90	10.90
2/D	18.90	17.90	16.90
1/DD	18.90	17.90	16.90
2/DD	21.90	20.90	19.90

Prices & Quantities are per 5-PACK

Post Packing & Ins.

All Colours

EXC VAT

1-3	5-PACKS	50p per pack
4-9	5-PACKS	30p per pack
10+	5-PACKS	POST FREE

Quality Promise

Like All diskettes from DISKING, these Coloured Diskettes are individually certified, and are from a leading world manufacturer. We offer our usual no-quibble money-back warranty.

What you get

All Coloured diskettes are supplied in packs of five (5) of ONE colour. They come in a FREE plastic library box, and with colour coder pens. You will also be entitled to any other applicable promotions at the time of ordering.

Please state when ordering, the number of 5-PACKS you require, and the type number of the diskettes. For example, supposing you want five red diskettes for your IBM PC, and five green diskettes for your (double sided) ACT Sirius, you would order One pack of R2/D & one pack of G2/DD.

DISKING International, Liphook, Hampshire, GU30 7EJ. Telephone (0428) 722563



Welcome

DISKING

COLOURED DISKETTES



FOR PRICES SEE
OPPOSITE

"I'll use the **orange** ones
for my IBM, the **blue** ones
for my Sirius, and the **green**
ones for my Apple"



"No! We'll use the **red** ones
for Masters, the **pale blue**
for bought ledger and the
yellow for word processing"



**FREE Plastic Library Box with every
'One-Colour' 5-Pack.**

Choose from six **RED, ORANGE, YELLOW,**
GREEN, PALE BLUE or **BLUE.**

Or Treat yourself to six 5-Packs, one of each colour!

DISKING

COLOURED DISKETTES



DISKING International, Liphook, Hampshire, GU30 7EJ. Telephone (0428) 722563



Welcome

Attention the trade:- Our usual minimum orders will apply & library boxes will be charged extra

QUALITY NEVER LOOKED SO GOOD—

Now everyone with a BBC or IBM PC will want to get their paws on CUB's sleek new D series plastic cabinet — a triumph of ergonomics and up to the minute design. Within it is the CUB 653 MEDIUM RESOLUTION colour monitor — the perfect mate for computer users who wish to combine the advantages of brilliant, low cost colour graphics with 80 column processing software.

CUB 653's remarkable depth of colour is enhanced by minimal screen glare, thanks to a super high contrast CRT. Even in well lit environments the 653 (H) x 585 (V) resolution and 0.43mm dot pitch produces 80 column text which is pin-sharp and easy to read. Owners of SHARP, RML 480Z, APPLE Series, WANG and other leading computers needn't feel left out, because CUB 653's compatibility extends to these models and many more.



**PICK ONE UP
FOR JUST £299** inc. VAT

**NEW LOW PRICE,
NEW PLASTIC CABINET —
THERE'S NEVER BEEN A
BETTER TIME TO BUY.**

Standard Resolution version also available in new cabinet. Both Standard and Medium resolution models produced in metal cabinets if required.



MICROVITEC 653
CUB
COLOUR DISPLAYS

Microvitec PLC, Futures Way, Bolling Road, Bradford, BD4 7TU, West Yorkshire.
Tel: (0274) 390011 Telex: 517717

Available from High Street Computer Retailers and selected branches of W. H. Smith, Harrods, John Lewis Partnership, John Menzies with selected models available from larger branches of Boots.

NEW

DataLife® by Verbatim®



- ★ **Smart New Image**
- ★ **Superb New Packaging**
- ★ **Same Incredible World beating Quality**

In stock NOW at **DISKING**

see our following Double page advertisement to order YOUR new Datalife diskettes

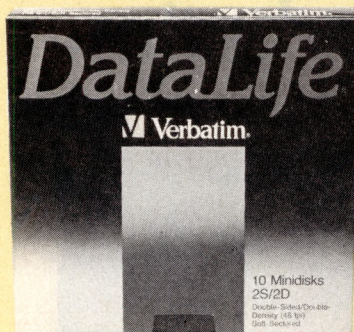
DISKING International, Liphook, Hampshire, GU30 7EJ. Telephone (0428) 722563



Welcome

DISKING

Means Business



The Biggest name in Disks!

5 1/4" Diskettes

Prices and quantities relate to **Ten-Packs**

PRICES EXC VAT	1-4	5-9	10+
MD 525-01 S/S 48 tpi	22.90	21.90	20.90
MD 550-01 D/S 48 tpi	29.90	28.90	27.90
MD 577-01 S/S 96 tpi	28.90	27.90	26.90
MD 557-01 D/S 96 tpi	36.90	35.90	34.90

Certified for single OR double density
48 tpi suitable for 35 or 40 track operation
96 tpi suitable for 77 or 80 track operation

8" Diskettes

Prices and quantities relate to **Ten-Packs**

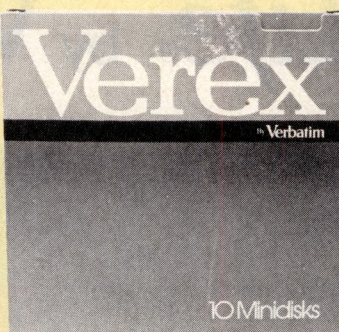
PRICES EXC VAT	1-4	5-9	10+
FD 34-9000 S/S S/D	31.90	30.90	29.90
FD 34-8000 S/S D/D	31.90	30.90	29.90
DD 34-4001 D/S D/D	36.90	35.90	34.90

32 Hard Sector available at same price

3 1/2" Microdisks

Prices and quantities relate to **Ten-Packs**

PRICES EXC VAT	1-4	5-9	10+
MF 350 S/Sided 0.5Mb	42.90	41.90	40.90



Famous name — Low Prices

5 1/4" Diskettes

Prices and quantities relate to **Ten-Packs**

PRICES EXC VAT	1-4	5-9	10+
MD 200-01 S/S 48 tpi	19.90	18.90	17.90
MD 250-01 D/S 48 tpi	23.90	22.90	21.90

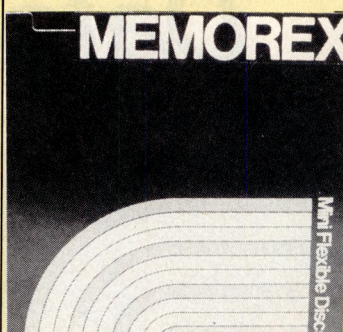
48 tpi suitable for 35 or 40 track operation

8" Diskettes

Prices and quantities relate to **Ten-Packs**

PRICES EXC VAT	1-4	5-9	10+
FD 34-1500 S/S S/D	22.90	21.90	20.90
DD 34-1501 D/S D/D	29.90	28.90	27.90

32 Hard Sector available at same price



MEMOREX Memory Excellence

5 1/4" Diskettes

Prices and quantities relate to **Ten-Packs**

PRICES EXC VAT	1-4	5-9	10+
3481 S/S 48 tpi	22.90	21.90	20.90
3491 D/S tpi	29.90	28.90	27.90
3504 S/S 96 tpi	28.90	27.90	26.90
3501 D/S 96 tpi	36.90	35.90	34.90

Certified for single OR double density
48 tpi suitable for 35 or 40 track operation
96 tpi suitable for 77 or 80 track operation

5 1/4" Diskettes HIGH DENSITY

Prices and quantities relate to **Ten-Packs**

PRICES EXC VAT	1-4	5-9	10+
5500 D/S 1.6 MByte	49.90	48.90	47.90

3 1/2" Microdisks

Prices and quantities relate to **Ten-Packs**

PRICES EXC VAT	1-4	5-9	10+
6100 S/Sided 0.5Mb	42.90	41.90	40.90



Maxell — The Gold Standard

5 1/4" Diskettes

Prices and quantities relate to **Ten-Packs**

PRICES EXC VAT	1-4	5-9	10+
MD1-D S/S 48 tpi	23.90	22.90	21.90
MD2-D D/S 48 tpi	34.90	33.90	32.90
MD1-DD S/S 96 tpi	34.90	33.90	32.90
MD2-DD D/S 96 tpi	42.90	41.90	40.90

Certified for single OR double density
48 tpi suitable for 35 or 40 track operation
96 tpi suitable for 77 or 80 track operation

8" Diskettes

Prices and quantities relate to **Ten-Packs**

PRICES EXC VAT	1-4	5-9	10+
FD1-XD S/S D/Dens	32.90	31.90	30.90
FD2-XD D/S D/Dens	40.90	39.90	38.90

32 hard sector available at the same prices

3 1/2" Microdisks

Prices and quantities relate to **Ten-Packs**

PRICES EXC VAT	1-4	5-9	10+
MF2-DD D/Sided 1.0Mb	59.90	58.90	57.90

3" Microdisks

Prices and quantities relate to **Ten-Packs**

PRICES EXC VAT	1-4	5-9	10+
CF2 Compact D/S Floppy	39.90	38.90	37.90

DISKETTE STORAGE

Choose the box you like, buy three and get the fourth one FREE

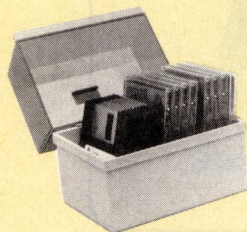
BUDGET RANGE

Budget Micro

30 Microdisk capacity (or 12 compact 3" disks) stored in 3 compartments. Smart two tone beige brown with strong steel hinges.

Part No:	Description	Price exc VAT
BM	30 Microdisk capacity	6.90

If buying 3 to get one FREE, P&P @ 4 unit rate please

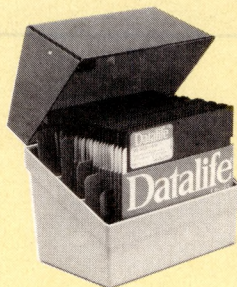


Budget 30

30 Minidisk capacity in smart beige brown with strong steel hinges, complete with five coloured dividers.

Part No:	Description	Price exc VAT
B30	30 Minidisk capacity	5.90

If buying 3 to get one FREE, P&P @ 4 unit rate please

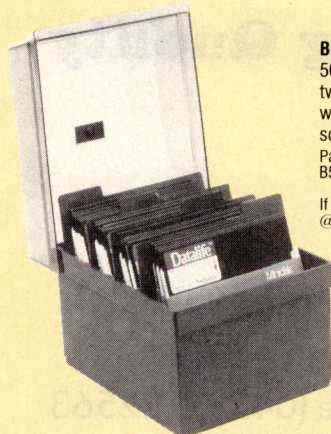


Budget 50

50 Minidisk capacity in smart two tone brown, complete with four dividers and non scratch rubber feet.

Part No:	Description	Price exc VAT
B50	50 Minidisk capacity	8.90

If buying 3 to get one FREE, P&P @ 4 unit rate please



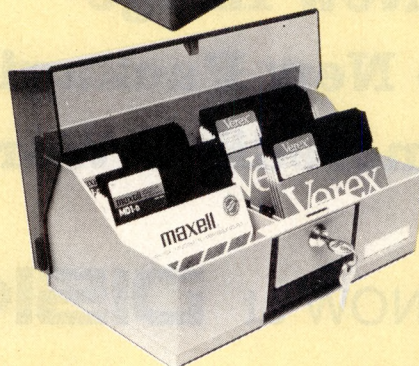
POPULAR RANGE

Disking Swing-Lid Lockable Box

60 Minidisk capacity, complete with keys, dividers tags and even built in carrying handles.

Part No:	Description	Price exc VAT
DSL8	60 Minidisk capacity	17.90

If buying 3 to get one FREE, P&P @ 4 unit rate please



Jumbo Swinger

A massive 120 minidisk capacity (with arms removed). Adjustable arms compensate for less diskettes, complete with keys and carrying handle.

Part No:	Description	Price exc VAT
JUMBO	100 Minidisk capacity	18.90

If buying 3 to get one FREE, P&P @ 4 unit rate please

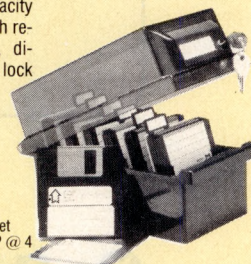
Executive Micro

50

Fifty 3.5" microdisk capacity complete with removable lid, dividers, tabs, lock and 2 keys

Part No:	Description	Price exc VAT
EM50	50 microdisk capacity	19.90

If buying 3 to get one FREE, P&P @ 4 unit rate please



Executive Mini 100

100 5.25" minidisk capacity complete with removable lid, dividers, tabs, lock and 2 keys.

Part No:	Description	Price exc VAT
EM100	100 minidisk capacity	22.90

If buying 3 to get one FREE, P&P @ 4 unit rate please

EXECUTIVE RANGE

The ultimate in quality, these beautiful Austrian made storage boxes in luxurious two tone deep brown come with everything one could ever want. The lids not only swing open and shut, but are also removable if shelf space is prohibitive. They come with ingenious dividers where even the tabs are adjustable and protected from dirty finger marks. The wonderfully engineered locking mechanism comes with 2 keys and a master filing tab.

Dysan
TEN 5.25 INCH DISKETTES

SPECIAL CONFIGURATION

Dysan For The Discerning 5 1/4" Diskettes

Prices and quantities relate to **Ten-Packs**
PRICES EXC VAT

	1-4	5-9	10+
104/1D S/S 48 tpi	23.90	22.90	21.90
104/2D D/S 48 tpi	34.90	33.90	32.90
204/1D S/S 96 tpi	34.90	33.90	32.90
204/2D D/S 96 tpi	42.90	41.90	40.90

Certified for single OR double density
48 tpi suitable for 35 or 40 track operation
96 tpi suitable for 77 or 80 track operation

8" Diskettes

Prices and quantities relate to **Ten-Packs**
PRICES EXC VAT

	1-4	5-9	10+
3740/1D S/S D/Dens	32.90	31.90	30.90
3740/2D D/S D/Dens	40.90	39.90	38.90

32 hard sector available at the same prices

How To Order

Official Government Orders Welcome

We supply all Government bodies including Schools, Universities, colleges, Hospitals, the Utilities, Research Establishments, Armed Forces, the Ministries and Local Authorities world-wide. We will despatch within 4 (YES, FOUR) working hours from receipt of your official order number received either by post or telephone and all orders are handled in the strictest confidence and to the letter. All other customers, cheque with order please payable to DISKING. If you are a large establishment and cannot raise cheques without an invoice, please post or telephone your order, and we will send a pro-forma invoice by return for your accounts department to pay against.

Credit Card Orders

All orders left on the answering machine qualify for a FREE DISKING logobug to stick on your computer. You may call 365 days a year, 24 hours a day, and you may speak for as long as you like when you leave the following details:

1. Day-time telephone number
 2. Cardholder name and address
 3. Delivery (or invoice address) if different
 4. Your Credit Card Number
 5. What you want and how many
 6. Normal or first class post
- We welcome Access (Mastercharge), Barclaycard (VISA) and Diners Club International, and there is NO credit card surcharge. Alternatively you may write your credit card number on your order

Leave the REST to US!

Urgent Orders

If you are posting your order, leave out the word FREEPOST from our address, and use our normal post code GU30 7EJ and do not forget to stamp it First Class. If you are telephoning your order, please make it clear that you wish to pay for your goods to be sent to you by First Class Post

First Class Rates

Minidisks & Microdisks:
First Ten-Pack 2.00
Second and subsequent Ten-Pack 1.50



COLOURED Diskettes

Supplied in **Five-Packs** of one colour
Prices and quantities relate to **Five-Packs**
5 1/4"

PRICES EXC VAT

	1-9	10-19	20+
1D S/S 48 tpi	12.90	11.90	10.90
2D D/S 48 tpi	18.90	17.90	16.90
1DD S/S 96 tpi	18.90	17.90	16.90
2DD D/S 96 tpi	21.90	20.90	19.90

To order the colour your choice, just precede the type number with the appropriate letter, (R) RED, (O) ORANGE, (Y) YELLOW, (G) GREEN, (B) BLUE & (P) PALE BLUE. For the actual colours, please see our full colour advertisement back a couple of pages, or call and ask for our full colour brochure

**FREE
CLOCK**



value £8.95

with EVERY 20 Diskettes ordered at these prices

When you buy twenty 5.25", 8" or 3.5" diskettes at these prices, from any of our manufacturers, you will receive completely FREE of charge, this superb calendar clock with a large easy to read 24mm LCD display. Buy forty diskettes and you will receive two clocks and so on.

Offer ends 30th April 1985

PLUS

FREE with every Ten-Pack of diskettes from DISKING, (or Five-Packs if coloured disks). The Superb SEE10 Library Box. Also available individually for £2.50 exc VAT, either for 5 1/4" Disks (SEE10), or 3 1/2" Disks (SEE10-3). Now also available for 8" Disks (SEE10-8) at £3 exc VAT.

PLUS

FREE DISKING Colour Coders

A multicoloured pack of ten fibre tipped pens for colour coding your diskette labels. Available individually at 49p exc VAT

Postage & Packing Rates

UK Shipping Rate inc. ins. but exc VAT
5 1/4" DISKS OR MICRODISKS
1-2 packs each pack @ 95p
3-5 packs each pack @ 75p
6-9 packs each pack @ 60p
10+ packs POST FREE
ALL SEE 10 library boxes
ALL MEMOREX CLEANING KITS
1 off 60p each
2-7 off 40p each
8+ off POST FREE

DISKETTE STORAGE
Budget 30
1 off 1.00 each
2-7 off 70p each
8+ off POST FREE

8" DISKETTES
1-2 packs each pack @ 1.60
3-5 packs each pack @ 1.20

6-9 packs each pack @ 90p
10+ packs POST FREE

DISKING COLOUR CODERS
25p each — 5+ POST FREE

DISKMAILERS
£3.00 per 100

ALL OTHER STORAGE
1 off 2.00 each
2-7 off 1.30 each
8+ off POST FREE

DISKING DISKWRITERS
50-pack £1.00
1-4 off @ 40p each
5-9 off @ 30p each
10+ off @ 20p each

Bargain Corner Diskettes

5 1/4" Diskettes

Complete with a FREE SEE10 library box and Colour coders, these disks are certified and are from one of the manufacturers in this ad

Prices and quantities relate to **Ten-Packs**
EXC VAT No hub ring

	1-4	5-9	10+
UL1D S/S 48 tpi	13.90	12.90	11.90
UL2D D/S 48 tpi	20.90	19.90	18.90
UL1DD S/S 96 tpi	20.90	19.90	18.90
UL2DD D/S 96 tpi	24.90	23.90	22.90

Suitable for single OR double density

EXC VAT With hub ring

	1-4	5-9	10+
UL1DHR S/S 48 tpi	14.90	13.90	12.90
UL2DHR D/S 48 tpi	21.90	20.90	19.90
UL1DDHR S/S 96 tpi	21.90	20.90	19.90
UL2DDHR D/S 96 tpi	25.90	24.90	23.90

Suitable for single OR double density
48 tpi suitable for 35 or 40 track operation
96 tpi suitable for 77 or 80 track operation

Disking Supermailers

These diskette mailers come packed in 100s and are of a very clever copyright design. They will hold up to 4 diskettes complete with envelopes and are extremely robust

Part No.	Description	Price exc VAT
DSM	100 Supermailers	24.90

Trade Corner

FREE Aeroplane

Our latest aeroplanes have sound, so you'll have no trouble waking up those sleepy software engineers, when you throw it at them. Just call and ask for our flier, and we'll send you our latest trade pack with prices, special offers and sample unlabelled diskette. We'll also enclose a DPC (Disking Priority Customer Card) application form telling you how to buy at our 10,000 prices yet order in 50s.

Memorex Cleaning Kits



The latest computer care range from Memorex represent fantastic value for money, and are available individually or with a discount if purchasing all three.

Part No:	Description	Price
MKEY	Case/keyboard cleaning kit	4.90
MTV	VDU screen cleaning kit	4.90
MDD	Disk drive head cleaning kit	8.90

Buy all three kits together, and we will reduce the total price from 18.70 to 14.90 SAVING 3.80 — A BARGAIN IF EVER WE SAW ONE!

Looking for better ways to move data?



Meet the new generation in local modems.

Moving data over short distances is now even easier with Gandalf's new alternatives to long distance modems. Now there is no need to buy more modem capabilities than you need. Gandalf's new local modems are optimised for local data transfer.

mLDS 122: The Cost Cutter

For local asynchronous transmissions, you'll love this miniature local modem. You just plug it directly into your Data Terminal Equipment and connect it to your BT EPS8 or privately owned line. Then sit back and enjoy the point-to-point data service over a 7Km/4 mile range at 50 to 9600bps. It's BT approved and affordable.



SmLDS 349: A Mini in Sync

Here's the synchronous counterpart to the mLDS 122. Same plug-in convenience for point-to-point data service over a 4.8Km/3 mile range at 19.2Kbps (9.6Km/12 mile at 2400bps). No need for V.24 cable or power point. It takes its power from your terminal device and is BT approved.

LDS 309A: New Standard in Local Modems

Our popular LDS 309 is now available in a new compact LSI version with auto-equalisation. LDS 309A handles synchronous and asynchronous data at speeds as high as 19.2Kbps and it's BT approved.

Telephone (0925) 818484 for details today.

gandalf®

Gandalf Digital Communications Limited
FREEPOST
19 Kingsland Grange, Woolston
Warrington, WA1 1BR
Cheshire

DATATALK

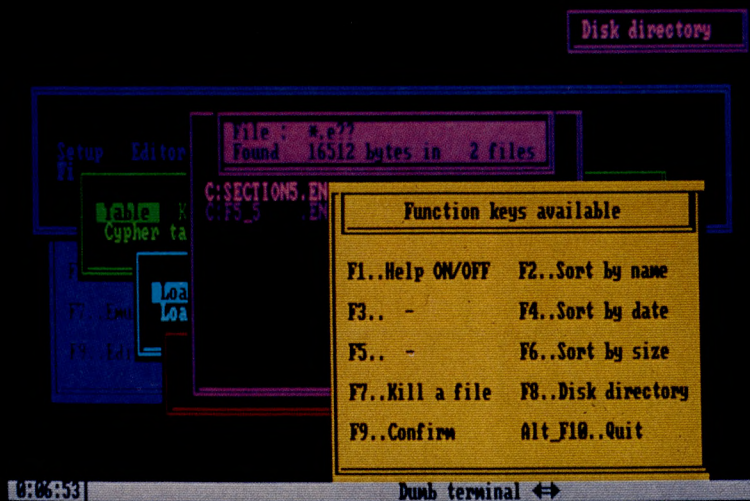
For further information contact:

Datasoft, Ilminster, Somerset

Telephone: (04605) 4809

Telex: 265781 MONREF G REF 83:DFT001

Telecom Gold: 83:DFT001



DATATALK OFFERS YOU —

- Terminal Emulations
- Two error checked file transfer protocols
- Split Baud rates
- On-line text editor
- Contextually sensitive help system
- Disk directory access
- User programmable function keys
- Overlaid windows for easy operation
- Datacode file encryption system

“... Datatalk goes a level above its competitors”

(P.BRIGHT — PCW JAN 85)

“Quite simply, it is the answer for anyone who requires a secure communications package that combines ease of use, power and versatility”

(JOHN FORREST, THORN EMI CSD)

DATATALK costs £135.00 and DATATALK + DATACODE FILE ENCRYPTION is £225.00



+ VAT

LARGEST COMPUTER CENTRE

in

MANCHESTER

BBC, COMMODORE, MEMOTECH, SINCLAIR, SHARP, SANYO, AMSTRAD, QL, EINSTEIN, ADVANCE 86

COMPUTERS

BBC Model B
(Free Recorder + Games) £389
Electron Call
Memotech 512 (Free rec) £275
Memotech 500 (Free rec) £199
Advance 86b Call
Sinclair QL Call
Sanyo 550 £640 + VAT
Sanyo 555 £799 + VAT
Einstein POA
Amstrad Call
Amstrad colour Call

MONITORS

JVC Medium Colour £199
JVC High £249
Microvitec Medium (QL) £275
Microvitec Medium (BBC) £299
Ferguson MC101 (TV-Mon) Call

PRINTERS

Shinwa CP80 CTI £234
Epson RX80 FT £289
Cosmos CP80 £214
Juki 6100 £388
Cannon 1080 Call
Brother HR15 £442
Star Gemini 10X Call
National Panasonic £335
Taxan Call

DISK DRIVES

Opus, Pace, Cumana, modems various

BBC ACCESSORIES

6502 2nd Processor £199
Z80 2nd Processor £349
Bitstick System £374
Graphpad £143.75

COMPUTER STATIONERY, DISKS, PLUGS, SOCKETS, CABLES, ETC.

TELEPHONE ANSWERING MACHINES/CORDLESS PHONES: NOW IN STOCK

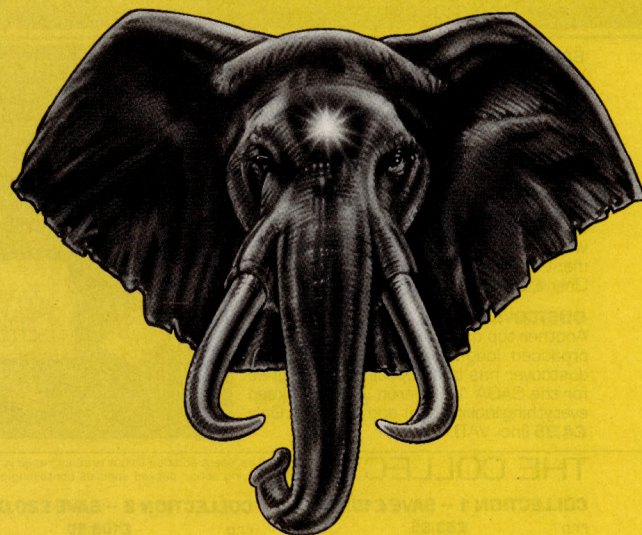
Wide range of books, software (Educational software specialist).
Showroom, demonstration facility. Prices include VAT, all items
available mail order. Personal Export scheme. Add £8 p&p if mail
order. We accept Visa and Access
Export dealer enquiries welcome



MIGHTY MICRO

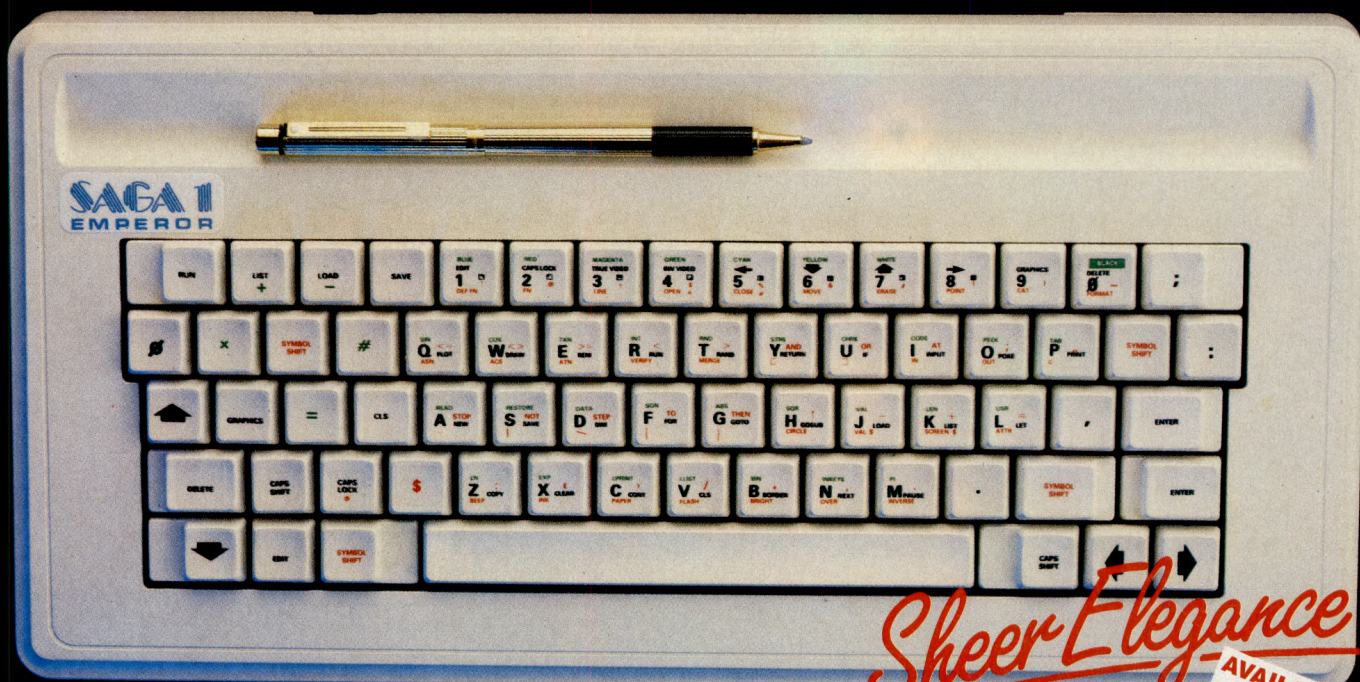


SHERWOOD CENTRE
268 WILMSLOW ROAD
FALLOWFIELD, MANCHESTER
TEL: 061-224 8117



REMEMBER

SAGA 1 EMPEROR



Sheer Elegance
-AVAILABLE NOW

THE KEYBOARD FOR ZX SPECTRUM COMPUTERS

- ✱ **EASY FITTING**
- ✱ **PLEASURE TO USE**
- ✱ **LONG LASTING**

The Saga 1 Emperor, equipped with 67 keys, is a carefully designed replacement keyboard incorporating many special functions for the popular Spectrum Computer. For business or pleasure, the Emperor will make your computing time more productive and

enjoyable. The SAGA 1 Emperor will enable you to use the Spectrum as a powerful programming tool easier and faster.

The style is easy:- for your benefit, the SAGA 1 Emperor has been designed to ensure that available Spectrum Peripherals will fit in the usual manner.

The assembly of the keyboard is simple — and fast. No soldering required, so that within just 5 minutes you can replace your current ZX Spectrum with the new SAGA 1 Emperor.

AND ALL THIS FOR JUST £54.95 (inc. VAT)

SAGA P.C.!

Your very own Personal Carrier, partitioned to neatly accommodate your Spectrum, Saga 1 Emperor and peripherals; Tape Recorder, Power Supply, Cables, manuals and cassettes. Of solid and attractive construction the P.C. is ideal for storing and transporting your computer accessories. The case uses a strong double stitched and bound Black Calf Vinyl with a tough thick ABS inner compartment, leather buckles and a strong handle. Only **£26.95** (inc. VAT).

DUSTCOVER

Another top quality product, this expertly produced long-lasting bound and sewn dustcover has been specifically designed for the SAGA 1 Emperor, which will keep everything looking neat and dust free. Only **£4.95** (inc. VAT).

THE COLLECTION



SOUNDBOOST

Hear that keyboard click with a SAGA SOUNDBOOST. The SAGA SOUNDBOOST is a tiny electronic circuit which considerably enhances the sound volume and quality of the Spectrum sound output. Adjustable from a whisper to a roar, the SOUNDBOOST provides added realism and excitement for games players and security for programmers (Hear that Keyboard Click!). No cutting, no soldering — just connect. Only **£9.50** (inc. VAT).

FLEXICABLE

Developed to relieve your Spectrum from the pressure of life, to fit your Spectrum and your add-ons taking the load with ease. By popular demand we now have two versions of the 9 inch FLEXICABLE available to suit your needs.

Male-Female FLEXICABLE — **£12.45**
Female-Female FLEXICABLE — **£9.50**
Converter PCB — **£2.95**

THE COLLECTION

The latest addition to our product range is The Collection, providing you with three money saving action packed specials containing quality products — an ideal gift.

COLLECTION 1 — SAVE £10.00!!

r.r.p. **£53.85**
Our special price **£43.85**
includes: Saga Personal Carrier **£26.95**
Soundboost **£9.50**
Dustcover **£4.95**
Flexicable (M-F) **£12.45**

COLLECTION 2 — SAVE £20.00!!

r.r.p. **£108.80**
Our special price **£88.80**
Collection 1 **£53.85**
Saga 1 Emperor **£54.95**

COLLECTION 3 — SAVE £30.00!!

r.r.p. **£238.75**
Our special price **£208.75**
Collection 2 **£108.80**
48K Sinclair ZX Spectrum **£129.95**

Please write to: SAGA Systems Limited,
Dept. 2 Eve Road, Woking, Surrey
Telephone Woking (04862) 69527/22922
or Telex 859298
All prices include VAT
P&P free for Sound Boost and Flexicable.
P&P £1.25 for SAGA 1 Emperor U.K.
£4.00 for SAGA 1 Emperor Europe
£15.00 for SAGA 1 Emperor U.A.E.

Please send me
Name _____
Address _____

The following SAGA PRODUCTS _____

Total amount enclosed £ _____

Please make CHEQUES/P.O. Payable to SAGA Systems Ltd.

**DISTRIBUTOR &
TRADE ENQUIRIES
CALL NOW ON**

WOKING (04862) 22922



MICROTIME INTERNATIONAL LIMITED

106A BEDFORD RD, WOOTTON,
BEDS MK43 9JB
Telephone (0234) 767758/766351

NEC PC-8201A
TANDY MODEL 100
OLIVETTI M10

From Tokai Create

PASOCALC – ROM based spreadsheet £80

From A.M.P. Incorporated

Forth £90

Assembler – 2 pass 80C 85 assembler £65

The Journalist – Unique text formatter with graphic layout display £65

From Travelling Software Inc.

Travelling Writer – acclaimed word processor £50

Time Manager – time costing for professionals £50

Appointment Manager – calendars & appointments £40

Sales Manager – sales activity/customer notes £50

Expense Manager – full expense accounting £50

Project Manager – budgets/actuals/costs/activities £60

T-Base – the ultimate relational database system £80

T-Backup – advanced tape filing utility £25

From Chattanooga Systems

Autopen – full featured word processor £30

Autopen N&A – as above with name/address options £40

Autopad – the 5K spreadsheet with every feature £40

Trip – expense account details and trip log £25

ChequeBook – personal cheque book record £25

Book – single entry accounts package £25

Tfile – tape filing utility £20

From Datacount Inc.

Data-Dex – automated desktop card index system £35

Data-Text – text formatting and word processor £40

Data-Code – bar code generation package £30

Data-Max – database, any record in 0.5 seconds £50

From Silicon Crafts/Micro Time

MPLAN – spreadsheet with templates £50

MSOLVE – equation solver with templates £50

MBRAIN – full RPN calculator with stacks/ memories £20

MLABEL – general purpose labelling program £30

From Custom Software

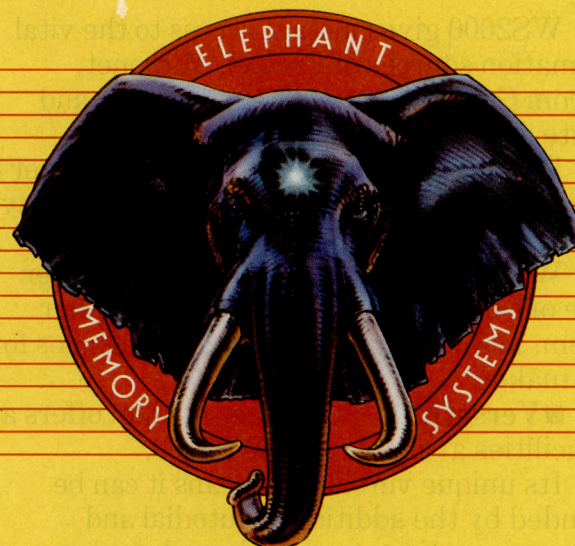
Assembler – (in machine code) £40

(all prices ex-VAT, 50p per item UK p&p, 2nd class post)

**SEND OR RING FOR DETAILS
TODAY FROM MICROTIME**



ELEPHANT NEVER FORGETS



Modem WS 2000: why it's the experts' choice.

You don't need to be told about the information revolution – you already know that without efficient data communications, you and your business may not survive it.

And you know that a modem will be a vital part of your survival kit.

This is why you should choose Modem WS2000 from Miracle Technology.

Quality – In concept and construction Miracle Technology sets the standards other modem manufacturers aim for.

Quite simply, WS2000 is one of the best designed, best made modems you can buy.

It is approved for PTT use in the UK and Holland, with approval pending in other European countries.

Flexibility – As a multi-speed, multi-standard modem, WS2000 enables data transfer between almost any two computers – world-wide.

WS2000 gives instant access to the vital information sources of Prestel, Miconet, Telecom Gold and a vast range of public and private databases.

WS2000 can also convert your computer to a telex terminal, giving you inexpensive 2-way international telex facilities.

WS2000 is suitable for use with a wider range of computers than virtually any other modem, and we can offer software packages for most makes.

Versatility – No other modem offers all the facilities available with WS2000.

Its unique versatility means it can be expanded by the addition of autodial and autoanswer options (presently undergoing approval testing with BABT), plus direct computer software control of the modem and much more.

Service – A large dealer/distributor network both in the UK and abroad means you're never far from a WS2000 stockist.

And our Customer Service and Technical Departments are happy to give help and advice.

The Experts – Thousands of users depend on WS2000 – local authorities, government departments, multi-nationals, private companies and individuals.

WS2000 is the modem chosen by the BBC to demonstrate a UK-USA datalink live on TV; selected by Cable & Wireless/Western Union for their Easylink Telex Service; taken

round the world on Operation Raleigh; in action for CBS News, sending front-line war reports around the world.

WS2000 is the modem used by people who need reliable data communications today – and every day.

WS2000, with BT telephone lead, mains power supply and comprehensive operating manual costs only **£129.95 exc.** (£154.73 inc. VAT & UK delivery) – you may also need a computer lead (£10.35 inc.) – specify computer when ordering.

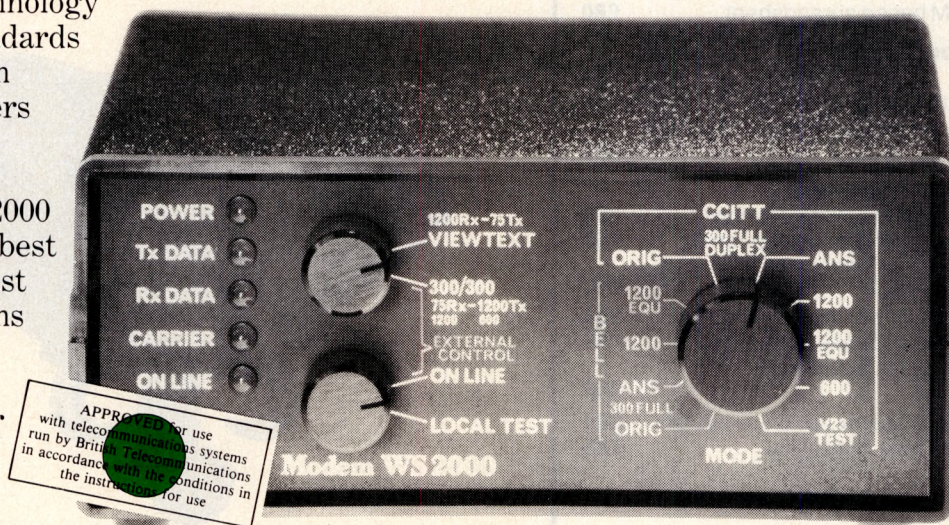
A small price to pay for survival.

Order by cheque/Visa/Access/Trade or official order to:

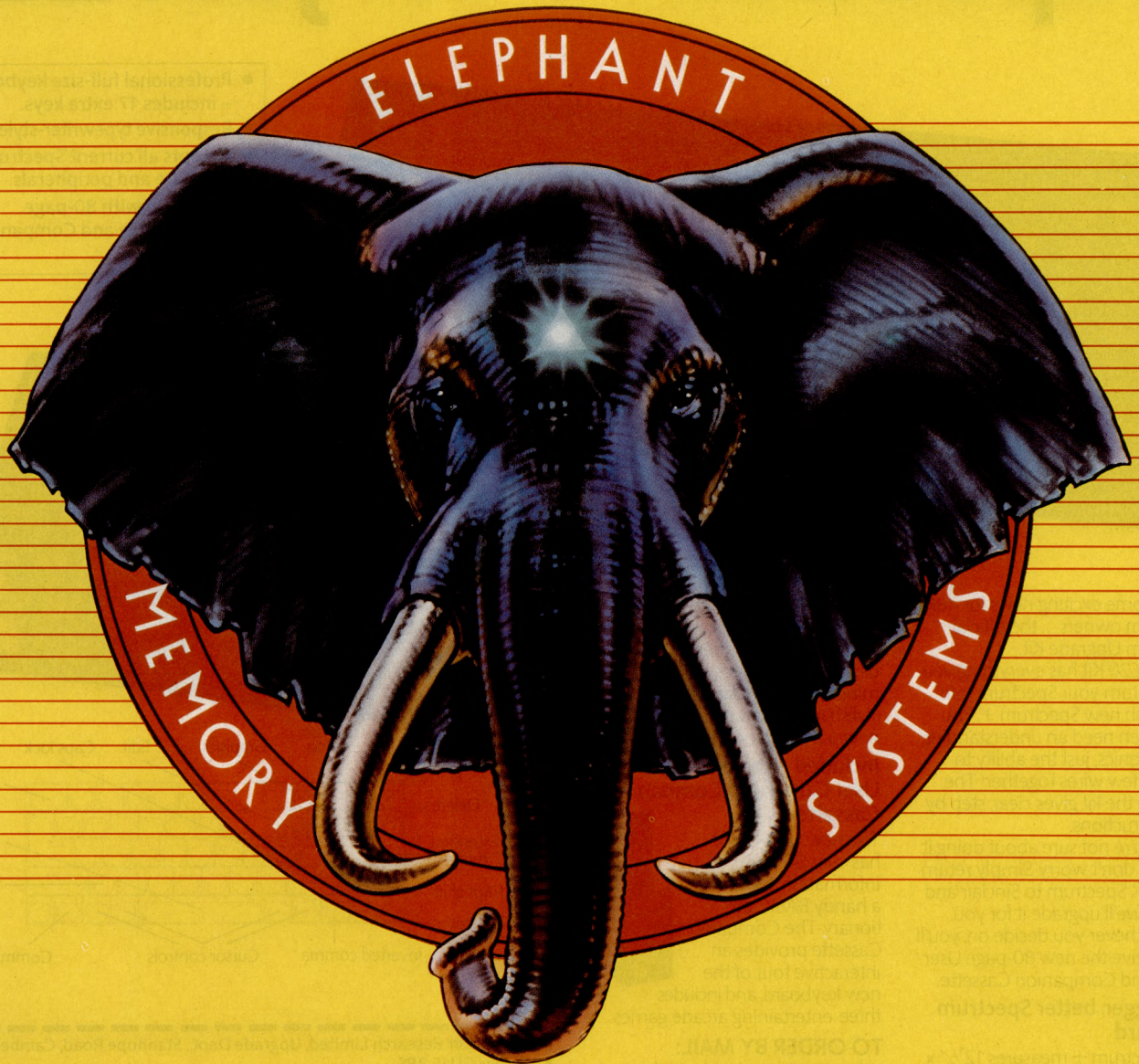
Miracle Technology (UK) Ltd,
St Peters Street, Ipswich IP1 1XB.

☎ 0473 50304 ☐ 946240 CWEASY G 19002985

**MIRACLE
TECHNOLOGY**
we thought of tomorrow, yesterday.



REMEMBER



ELEPHANT NEVER FORGETS

Get the best from your computer with ELEPHANT disks. Certified 100% error-free and problem-free, and with quality maintained for at least 12 million passes, ELEPHANT disks are guaranteed to meet or exceed every industry standard and are compatible with virtually every computer on the market.

Look for the ELEPHANT sign at your local Dealers – or in case of difficulty, phone or write direct to Dennison Manufacturing Co. Ltd.



Dennison

Dennison Manufacturing Co. Ltd.

Colonial Way, Watford, Herts WD2 4JY, Tel: Watford (0923) 41244, Telex: 923321

France: Soroclass, 8, Rue Montgolfier - 93115, Rosny-Sous-Bois, Tel: 16 (1) 855-73-70

Germany: Marcom Computerzubehör GmbH, Podbielskistr. 321, 3000 Hannover 1, Telex: 923818

Other Countries: Dennison International Company, 4006 Erkrath 1, Matthias-Claudius-Strasse 9, Telex: 858 6600

New - the official Spectrum Upgrade!

Turn your Spectrum into

a Spectrum+ for just £20



- Professional full-size keyboard – includes 17 extra keys.
- Responsive typewriter-style action.
- Accepts all current Spectrum software and peripherals.
- Complete with 80-page User Guide and Companion Cassette.

Here's some exciting news for 48K Spectrum owners ... the official Spectrum Upgrade Kit.

The £20 Kit has everything you need to turn your Spectrum into the stylish new Spectrum+. You don't even need an understanding of electronics, just the ability to solder a few wires together! The leaflet in the kit gives clear, step by step instructions.

If you're not sure about doing it yourself, don't worry. Simply return your 48K Spectrum to Sinclair and for £30 we'll upgrade it for you.

Whichever you decide on, you'll also receive the new 80-page User Guide and Companion Cassette.

The bigger, better Spectrum keyboard

The Spectrum+ measures 12½" x 6". It has a large typewriter-style keyboard, with hard, moulded keys.

You'll find the new keyboard has a smooth, positive action – ideal for touch-typing, word processing, simulation programs, and extended programming sessions. Two retractable legs give a perfect typing position.

There are 58 keys in all, including 17 new keys. Programmers will be pleased to see dedicated punctuation keys, a space bar, and separate shift keys for graphics and extended modes. And a reset button allows you to clear a program from your computer's memory without disconnecting the power supply.

The official Spectrum Upgrade
Naturally your upgraded computer will accept all the peripherals in your Sinclair system - Interface 1, Microdrives and so on - as well as all

Spectrum software.

Just as important, new Spectrum software and peripherals will be designed with the Spectrum+ in mind. So the Sinclair upgrade adds stylish looks, new capabilities ... and new potential for the future.

Included – the new Spectrum+ User Guide and Companion Cassette

The new User Guide has over 80 pages of information, including a handy BASIC dictionary. The Companion Cassette provides an interactive tour of the new keyboard, and includes three entertaining arcade games.



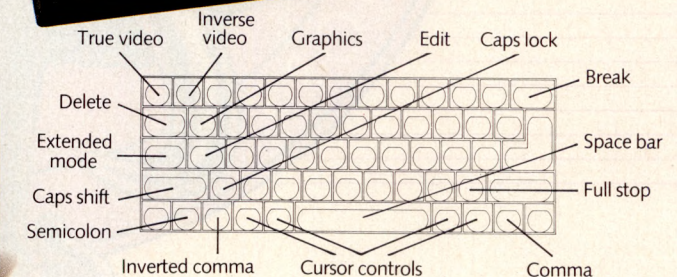
TO ORDER BY MAIL:

When ordering the Upgrade Service, send off your 48K Spectrum to the address below, carefully wrapped, together with the completed coupon and appropriate payment. (Please do not return the mains adaptor, manual or other ancillaries.) Your upgraded computer will be despatched to you within 10 days of receiving your order.

When ordering the Upgrade Kit, simply complete the coupon, enclosing the appropriate payment and post it to us at the address below. Please allow up to 28 days for delivery.

BY PHONE: Access or Barclaycard holders can call Camberley (0276) 685311 for personal attention, 9am to 5pm Monday to Friday. Only the Upgrade Kits can be ordered by phone.

Please note: the upgrade offer applies to working 48K Spectrum models in the UK only.



To: Sinclair Research Limited, Upgrade Dept., Stanhope Road, Camberley, Surrey, GU15 3PS.

All prices include VAT, post and packing, User Guide and Companion Cassette.

☐ Please send me the Spectrum+ Upgrade Kit. I enclose payment of £20.
OR

☐ Please upgrade my 48K Spectrum for me. I enclose my computer together with payment of £30.

I enclose a cheque/postal order payable to Sinclair Research Limited for £ _____
OR

Please charge my Access/Barclaycard no. _____

Signature _____ PLEASE PRINT

Name: Mr/Mrs/Ms _____

Address _____

PCW 503

Sinclair Research Limited,
Upgrade Department,
Stanhope Road, Camberley,
Surrey, GU15 3PS.

sinclair

CHESTER COMPUTER SCHOOL, BRITAIN'S PREMIER COMPUTING SCHOOL
presents

The Practical Computer Program Series (P.C.p.s.)

MODULE No. 1 A RELATIONAL DATABASE LETTERPROCESSOR

* Designed, produced and maintained by the School's own Software Factory.

* If you have ever wanted urgently a file on your desk of all your correspondence on a certain subject, product, account, client or supplier, and haven't been able to get it, then look no further because here it is, today!

* The School sets a **New Standard** in application software.

* Each licence holder receives a unique guarantee, unmatched by any other software house. 12 months guarantee including:—
— Training
— Modification Rights
— Expansion Modules
— Help line to the programs

* Direct from the School's Software Factory, probably the most powerful and useful program on a microcomputer today – yet simple to learn and use, just let it grow and GROW and GROW!

* **CAPACITY:** Limited only by your hardware. This is a big and powerful program which will grow with you AND your business.

* Priority delivery for Apricot, Sirius, IBMPC and Televideo.

* Full Integration.

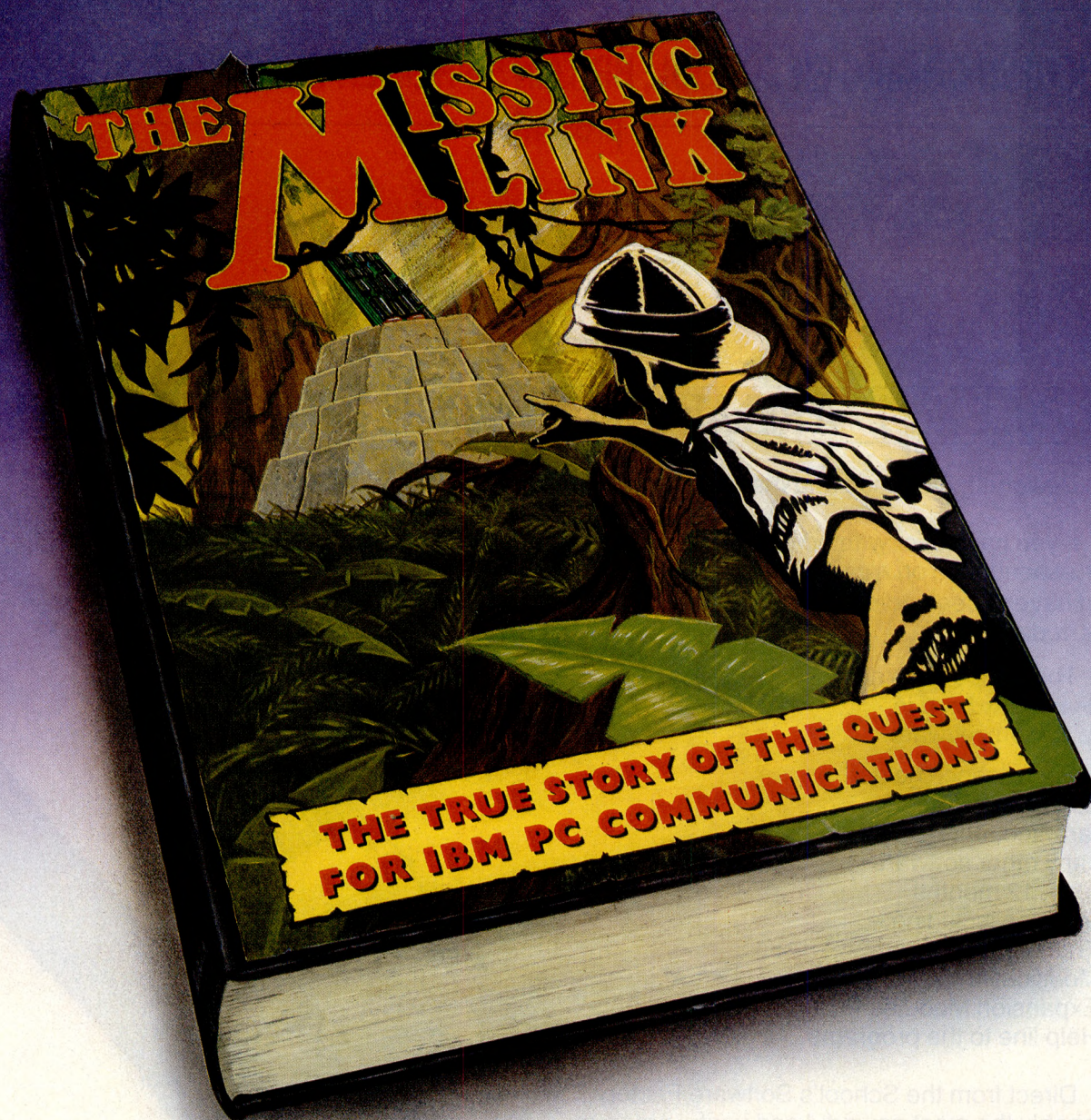
INCLUDING
Telex for the future
EASYLINK

CHESTER
COMPUTER
SCHOOL

**ALL YOUR
FILING AT
YOUR
FINGER
TIPS.**

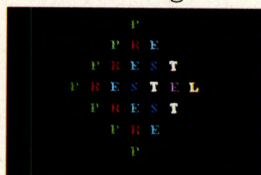


Chester Computer School Limited
7 Stanley Place, Chester, CH1 2LU. Tel: (0244) 318959



The search is over.

At last, the only complete, BABT approved communication's package for IBM® PC, XT, AT and compatible micros. 'The Missing Link' is an internal



APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.

modem which comes complete with a menu driven software package allowing auto-dial/ auto-answer access to private and public VIEWDATA and DATEL services such as PRESTEL®, TELECOM

IBM is a registered trademark of International Business Machines. Prestel and Telecom Gold are trademarks of British Telecommunications.

GOLD®, PSS, ONE TO ONE and many more.

The British designed expansion card plugs into one of the $\frac{2}{3}$ size hardware slots and offers CCITT V.21 300/300 and V.23 1200/75, 75/1200 full duplex with selectable error detection and correction protocols.

The Missing Link is available from Jaguar Communications (0727 32983) and IBM dealers at a price of only £499 + VAT.



For further information contact PC Communications Ltd., Business and Technology Centre, Bessemer Drive, Stevenage, Herts. SG1 2DX. Tel: Stevenage (0438) 316561. Telex 825824



**£70 OF MSX SOFTWARE — FREE
£12 MSX JOYSTICK — FREE
with every MSX computer**

MITSUBISHI MSX MICRO	£213
SANYO 112K MSX MICRO	£259
TOSHIBA 112K MSX MICRO	£242
TOSHIBA PLOTTER-PRINTER	£217
TOSHIBA 105 cps PRINTER	£299
SANYO MSX LIGHT PEN	£78

THE BEST MSX SOFTWARE TAPES

DEMONSTRATOR-1 shows all the MSX features	£5.20
DEMONSTRATOR-2 watch it, then list & learn	£5.20
MSX GRAPHICS shows high resolution graphics	£5.20
TEACH TYPING speed up your keyboard skill	£5.20
JUNIOR MATHS teaches kids to add & multiply	£5.20
MSX SMASHOUT addictive, maddening, multi-level	£5.20
VICIOUS VIPER eat men but not your own tail	£5.20
MSX OTHELLO the classic game now on MSX	£5.20
EXPLODING ATOMS two player strategy game	£5.20
GATE CRASHER try the slalom — 9 levels	£5.20
HELP ME take a deep breath before answering	£5.20
CAVE ADVENTURE extremely complex adventure	£5.20
ALL 12 PROGRAMS ABOVE FREE WITH EACH MSX MICRO FROM KNIGHTS	
MSX BASIC TUTORIAL 3 tapes — 20 programs	£15
BUDGET & FORECASTING ACCOUNTS	£25
COMPLETE STOCK CONTROL SYSTEM	£25
MSX WDPRO WORD PROCESSOR	£26

KONAMI MSX CARTRIDGES

TRACK & FIELD 1 same as Konami's arcade	£13
TRACK & FIELD 2 superb graphics	£13
HYPER SPORTS diving, trampoline, springboard	£13
SUPER COBRA the best flying fighter game	£13
CIRCUS CHARLIE lions, fire, tightrope, trapeze	£13
TIME PILOT smart bombs, UFOs, two player action	£13
COMIC BAKERY tragic, funny, cruel, amazing	£13
MONKEY ACADEMY great arcade graphics	£15
ATHLETIC LAND ropes, fountains, pitfalls	£15
ANTARTIC ADVENTURE the famous penguin game	£15

Dear Microfans,

We are acknowledged as experts in Japanese computers by TOSHIBA, SANYO & MITSUBISHI who all buy KNIGHTS programs. We are also enthusiasts and will always help you — we guarantee our deals are unbeatable. Ring or write for full details.

KNIGHTS RUSH SERVICE — ring us with your ACCESS or VISA number as we can usually deliver anywhere in the U.K. next day. In the last ten years we have sold thousands of Japanese micros Worldwide and have never charged for a single repair. Ring us for personal service.

Happy computing, Graham Knight & Neil Hunter

U.K. customers — delivery is free but add 15% VAT

EXPORT customers only — no VAT just add £10 for freight anywhere

KNIGHTS TV & COMPUTERS (est. 1937)
108 ROSEMOUNT PLACE, ABERDEEN
Tel: 0224 630526 Telex: 739169

ChipChat

Modem

ChipChat modems are the most versatile and up to date available at the price. With autoanswer as standard and intelligent autodial with speed conversion as an option, ChipChats may be used to access computers and databases such as Prestel, Micronet, Homelink and BT Gold.

ChipChats support the CCITT V21 protocol: 300/300 baud and the V23 protocol: 1200/75, 75/1200 and 1200/1200 (half duplex). Where local regulations permit, Bell standard operation may be used for dialling US databases.

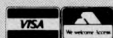
ChipChats use the latest technology and provide valuable extra features such as auto-disconnect to save your telephone bills, and speed conversion for operation with IBM PCs. A full complement of LEDs monitor data flow and the status of handshake lines on the Cannon D-type connector.

ChipChat CC2123A	Autoanswer	£130.35	(£149.90 inc VAT)
ChipChat CC2123AD	Autodial	£165.13	(£189.90 inc VAT)
	P&P £2.70 + VAT		Approval Applied For



Disisolve

Disisolve Limited
Aire and Calder Works
Cinder Lane, Castleford, West Yorks WF10 1LU
Tel: 0977 513141/4 Telex 557661 AGRAM G



PROHIBITED FROM DIRECT OR INDIRECT CONNECTION TO ANY
TELECOMMUNICATION SYSTEM RUN BY BRITISH TELECOMMUNICATIONS
ACTION MAY BE TAKEN AGAINST ANYONE DOING SO

CAMEL PRODUCTS

NIKE POWER BUFFERS

WAITING TILL YOU GET CAUGHT OUT?

Nickel Cad. batteries with ON-OFF switch. Versions for Spect., ZX81, ATMOS. Gives time to save program on tape. Visible status warning by LEDs £17.35.

DEALER ENQ.
WELCOME.



EPROM PROGRAMMERS

BLOPROM-SP

**A uniquely
sophisticated
EPROM
PROGRAMMER**

Eprom programmer for the 2516, 2716/32/32A/64/64A/28/128A, yes even the 64A/128A from Intel. Check, Read, Program & Verify all or part of Eprom.

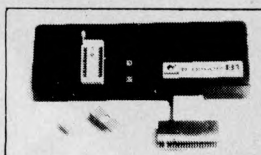
So immensely user friendly you'll hardly need the manual. Designed for the beginner but includes a single key entry route for the professional. Supplied as firmware, the m/c driver routine alone is worth more than the price of BLOPROM-SP. No Personality Cards, or other additions, just a Spectrum. Several inbuilt safety features. On-board Vpp generation. 28pin ZIF socket. Cabled connector and extender plug. ABS case.

BLOPROM-81

As above but for ZX81. Programs 2516, 2716/32/32A/64 & 27128

£79.95

AT LAST! for the Spectrum user. Put your programs, utilities, Assemblers into EPROMS for instant load from the unique ROM-SP



STATUS	NO. OF SYSTEM — HEX
	EPROM TYPE — 27128
	RAM START ADDR — 4000
	EPROM ST. ADDR — 0000
	JOB LENGTH — 4000
	TASK — CHECK
WHICH TASK DO YOU WISH TO DO	
W) CHECK THAT EPROM IS CLEAN	
X) READ THE CONTENTS OF EPROM INTO RAM	
Y) BLOW AN EPROM WITH DATA FROM RAM	
Z) VERIFY THAT EPROM DATA IS THE SAME AS IN RAM	
Q TO QUIT	R TO RESTART
FAST CODES AVAILABLE	
D	H
POR	WVYZ



ROM-SP

Ingenuous unit for Spectrum, with 2x28 pin sockets and a Reset button allows up to 16K of Basic or M/C program to RUN or LOAD instantly from EPROMS. Cabled connector and full extender card. NOTE: Does not disable Sinclair ROM.

for Spectrum

£29.95

PROMER-SP

A brand new Spectrum programmer for 2764/128. Zero insertion force socket & software on tape.

for Spectrum

£29.95

PROMER 81-S

The very popular PROMER-81 for the ZX81 has been adapted to the Spectrum and the price kept low.

for Spectrum

NEW PRICE £24.95

ROM-81

Provides two 24 pin sockets for up to 8K of EPROM memory in the 8-16K area. Can use 2516/32 or 2716/32

£14.95

PROMER-81

A low cost reliable programmer for 2516/32, 2716/32 EPROMS. Requires 4xPP3 batteries

NEW PRICE £24.95

DHOB1 1

Compact. Mains powered. Safe. Fully cased. Up to 3 EPROMS

UV ERASER

£18.95

DHOB1 2 With automatic timer

£22.95

CRAMIC-SP

NEW

for Spectrum

Ingenuous software paged 16K non-volatile CMOS RAM to co-exist in the same area as Spectrum ROM. Easy storage and retrieval of BASIC, M/C or DATA on a 48K Spectrum

£29.95

PRINT-SP

NEW

for Spectrum

Centronics Interface with standard centronics Cable. Plus free introductory offer SP WRTIE text processor.

£31.25

DREAM-81

64K Rampack with link options to disable 0-8-16K. Plus a 28 pin EPROM socket for 2716, 2732/2764 and 27128.

ZX81

£59.95

MEMIC-81

4K CMOS RAM with lithium battery. Easy SAVEing. 10yr storage and instant retrieval of programs.

for ZX81

£29.95

INTRODUCING MULTEPROM

The most economical, sophisticated gang copier in the world. Based on BLOPROM

£199.95



UK. VAT extra. No VAT on exports P+P UK Free
Europe +5% — Overseas +10% TLX 81574 CML
Cambridge Microelectronics. One Milton Road.

Cambridge Microelectronics Ltd. One Milton Rd. Cambridge CB4 1UY

tel (0223) 314 814



Herbie Briggs has just destroyed the myth that all floppy discs are created equal.

They seem equal. Until you look at the seams.

That's where equality ends.

Most companies seal their discs with a spot here, a spot there. Leaving most of each seam not sealed at all.

Sooner or later, the seams might do what comes naturally: they bulge. Warp. Pucker. Open up.

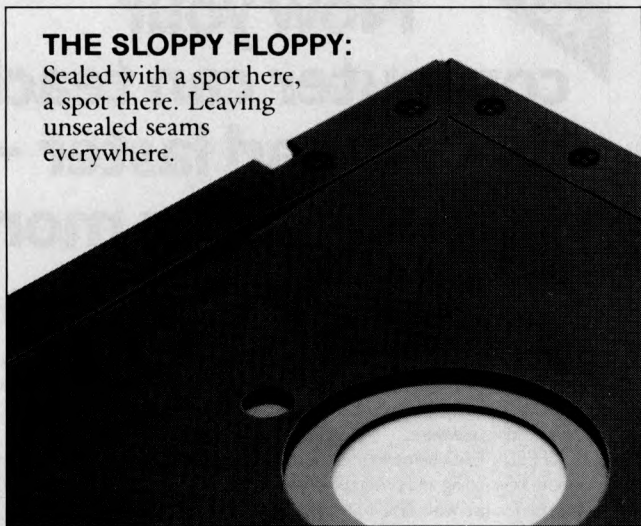
Pens, pencils, fingernails—even a four-year-old's, like Herbie—can catch and snag in those wide open spaces.

That's sloppy. And dangerous. Because if you put a sloppy floppy into your disc drive, it can jam your drive. Ruin your drive head. Lose your data.

So much for their seams. Ours are different.

THE SLOPPY FLOPPY:

Sealed with a spot here, a spot there. Leaving unsealed seams everywhere.



Memorex uses a process we developed, called Solid-Seam Bonding.

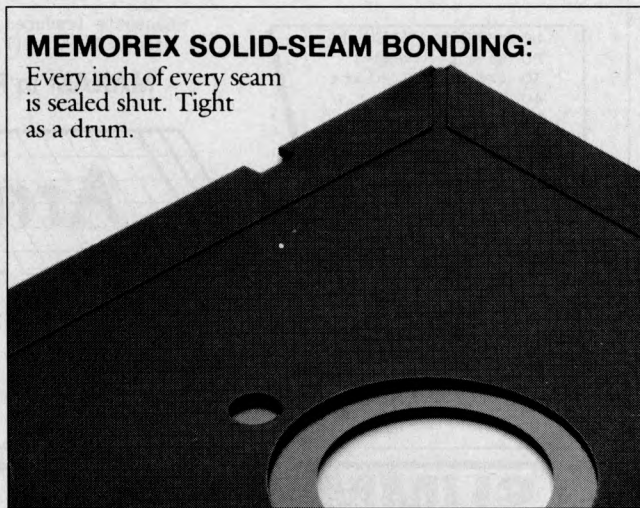
Solid-Seam Bonding seals shut every inch of every seam of every Memorex® floppy disc. Tight as a drum. That makes the Memorex

floppy stiffer. Stronger. And your data safer.

To resist bulging, warping, puckering, or opening up.

MEMOREX SOLID-SEAM BONDING:

Every inch of every seam is sealed shut. Tight as a drum.



To resist all the things that can jam your drive, ruin your drive head, or lose your data.

Which proves that a Memorex floppy disc isn't equal to all the others. It's better.

Solid-Seam Bonding is just one example of the extra care that goes into every Memorex floppy disc. Be it 8" 5¼" or the new 3½" Extra care that lets us guarantee every Memorex disc to be 100% error-free.

The next time you're buying a floppy disc—or a few hundred of them—just remember this:

It's always better to be safe than sloppy.

For more information on the full line of Memorex quality computer media products, including computer tape, call Memorex U.K. Ltd., 96-104 Church Street, Staines, Middlesex. Tel: 0784 51488



Your Data. When it matters, make it Memorex.™

MEMOREX

Announcing **MAXAM** for the AMSTRAD CPC464

The start of a complete Expansion System...

**SOFTWARE
in ROM!**

SIDESWAYS ROMs at last!
No more loading...
Leaves 40K free!

The perfect system:

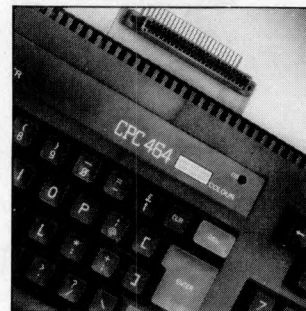
- * All-powerful Assembler
- * Complete Disassembler
- * Full screen editor
- * Multi-function Adaptor
- * Huge expansion potential in one simple unit!

So easy to use and learn....

Meet MAXAM - a new full-feature no-compromise Assembler/Disassembler/Editor - with a difference. It's in a very full 16K EPROM which plugs directly into the AMSTRAD. No waiting while it loads - it's always there! You can still use the Disc unit. You also get, as a bonus, a new expansion socket for Arnor's new range of Sideways ROM cartridges (containing, for example, our forthcoming Word Processor).

MAXAM uses no BASIC RAM space. It lets you mix BASIC and Machine Code - just like the BEEB! Or, you can assemble direct from the Editor, and you can even use the Editor to edit BASIC programs!

MAXAM is ESSENTIAL software for the AMSTRAD enthusiast.



```
10 MEMORY HIMEM-10
20 start=HIMEM+1
30 :ASSEMBLE, start
40 'get start
50 'limit &FFFF
60 'ORG start
70 'CP 10:SCF:RET Z
80 'RST 1,&B7F2
90 'ORG &BD2B
100'JP start
110'END
```

Cassette (reduced specification): £13.50
Disc: £26.90. All prices include p.& p.

MAXAM in ROM £59.90



High Quality Software

Software Houses: We have the perfect low-cost system for software in ROM! Talk to us!

Technical Data

- *Super-fast 3000 lines/min assembly
- *Conditional Assembly *Plain English error messages
- *Full Expression evaluation
- *Unrestricted label names
- *Directives include: ORG, BYTE, WORD, TEXT, RMEM, LET, IF, GET, PUT, LIMIT, CODE, NOCODE, READ.
- Commands include: LIST, NOLIST, LISTP, TITLE, PAGE, PLEN, WIDTH, DUMP.
- *Menu-driven Screen Editor includes move copy and delete block, tabs, search and replace, print all/part of text, Load/Save all/part of text.
- Disc/ROM version only: Register display, Memory Edit commands, breakpoint, string search in RAM. Link to AMSDOS.

Technical Enq. 01 852 2174

Cheques/P.O.s to: Arnor Ltd, PO Box 619, London SE25 6JL. Order Hotline 01.653.1483 (2pm-6pm)

SUMMERFIELD SOFTWARE

RETURN FROM PARIS

Fly, drive or hitch — Can 003.5 get the secrets home? Use your skills to choose appropriate transport on each stage of the journey.
BBC Disk only **£11.95**

TREASURE HUNT

Work your way around the map and find the two keys to the treasure. Beware, main roads are dangerous. Excellent use of Mode 7 graphics brings map reading skills alive — 2 programs, one uses references, one compass directions.
BBC **£12.00** Disk **£14.00**

TANK TRACKS

Program a tank to reach its base. Beware of minis and the 'Edge of the World'. Ideal as an introduction to problem solving. Programs consist of three commands — F = forward, L = turn left and R = turn right.
BBC **£9.95** Disk **£11.95**

★ ALL THREE ON DISK **£26.00** ★

EQUATIONS OF LINES: Demonstrates the graphs produced by equations — type in your own equation and see the graph appear.

ED 1 — includes: Think of a Word, Counting On, Pye Charts, Simple Division.
Each **£6.95** Disk **£9.00**.

All these programs are used in our school — All were written with the Educational user in mind.

Prices inclusive of postage and packing. VAT not included — add 15%. DISCOUNT — 5% Schools. 15% Special Schools.

Summerfield School, 141 Worcester Road, Malvern, Worcs. WR14 1ET.

NEW!

Now your computer can teach you to read faster — and remember more!

Did you know that the faster you read, the more you absorb?

Now SPEED READ will double your reading speed quickly and easily in your spare time at home.

This is a major breakthrough in home education which will bring you rapid rewards. Businessmen can dramatically cut time spent on paperwork, students and schoolchildren will find study easier and more fun, housewives can double their reading pleasure.

SPEED READ helps your computer to help you to a more rewarding and profitable life. Available on cassette for use with BBC Micro B, ZX Spectrum 48K and Commodore 64 systems, and on disk for use with Sirius (MS dos) and IBM (PC dos) systems.

Available exclusively from HI-YIN Music, Department SR/PW, 43 Church Hill Road, OXFORD OX4 3SG.

Please send me the SPEED READ programme suitable for BBC Micro B/Commodore 64/ZX Spectrum 48K (cassette only)/Sirius (MS dos)/IBM (PC dos) (disk) system quickly!*

Name: _____

Address: _____

Postcode: _____

Signature: _____

I enclose cheque/P.O.* for £16.95 (inc. VAT & postage & packing) for the cassette. £29.95 (inc. VAT & postage & packing) for the disk.

Post to HI-YIN Music, Dept. SR/PW, 43 Church Hill Rd., OXFORD OX4 3SG.

* Please delete as applicable





THE FASTEXT 80 Dot Matrix Printer from the New Force in Computer Printers



**SMITH
CORONA**

The Fastext 80 comes from an exciting new range of printers created to give speed, reliability and flexibility to the businessman at a price to suit the home user. Models in the range are compatible to all home computers, PCs and business micros. The Fastext 80 has a Centronics parallel interface – an RS232C serial interface is optional.

A machine of the highest quality, the six-pitch Fastext 80 performs at a speed of 80 cps with 80 column width (at 10 cpi). The host of features include a full line buffer, graphics capabilities, bi-directional text printing and logic-seeking. Friction feed is standard with a tractor feed available for continuous stationery.

Fill in the coupon and find out how you can make the most of your computer with a printer from Smith-Corona Data Products.

To: Smith-Corona Data Products, Unit 23, Northfield Industrial Estate, Beresford Avenue, Wembley, Middlesex HA0 1XP.

Please send me:

- ☐ A free copy of the full colour printer brochure.
- ☐ A list of local dealers.

Name _____

Company (if appropriate) _____

Address _____

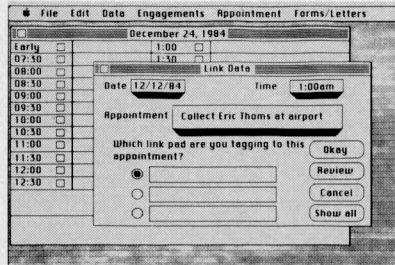
Post code _____ Tel. No. _____

Make and model of computer used _____

TEN NEW WAYS TO IMPROVE THE



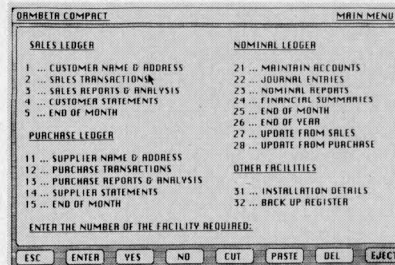
TIME BASE™



Timebase is a Time Manager which organises your day-to-day activities and keeps track of your appointments and meetings. You can even integrate information from your other Macintosh Software with appointments on your schedule.

£165.00

Ormbeta COMPACT ACCOUNTING™

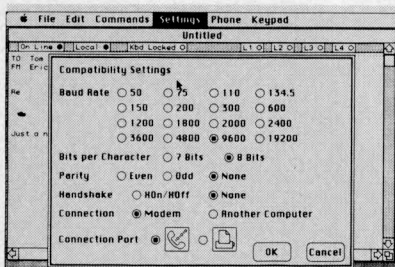


A fully integrated accounts package providing Sales, Purchase and Nominal Ledgers with advanced management report facilities. The excellent documentation will guide you through the whole process of creating and maintaining your accounts.

£350.00



MACTERMINAL™

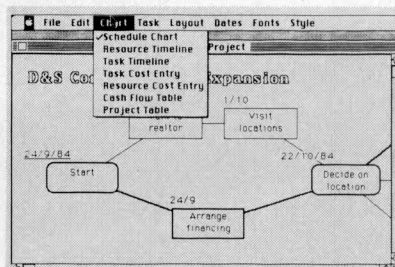


MacTerminal is a communications package from Apple Computer which can be configured for most other computers and information services. You can work in either 80 or 132 columns, and information scrolling off the display can be easily reviewed. MacTerminal also integrates with other Macintosh Software that manipulates text or numbers.

£69.00



MACPROJECT™

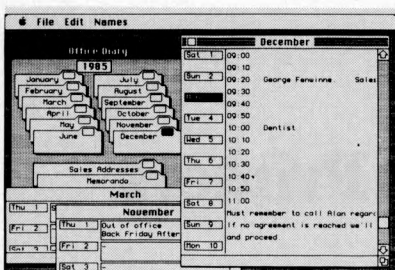


MacProject is a critical path analysis package from Apple Computer which transforms the normally time consuming task of project management. By manipulating and updating project activities within a graphic model of your project, you can efficiently monitor and manage its resources and costs.

£99.00



LASER DESK DIARY™

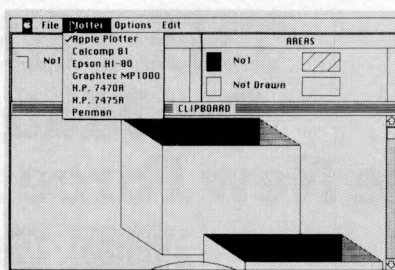


Laser Desk Diary, a combined desk diary and address book system that uses Macintosh's window capability for the examination of multiple days and/or months simultaneously. Laser Desk Diary provides a quick and easy way to manage your day-to-day activities.

£75.00



MACPLOT™

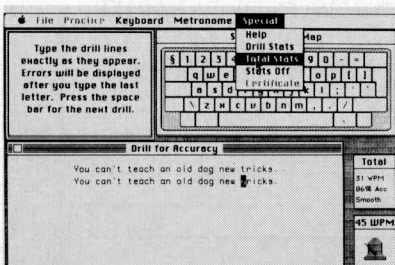


MacPlot enables you to print information on a plotter instead of your image writer. It supports multiple pen plotters and will even prompt you to change pens where more colours/thicknesses are required. MacPlot works with a wide range of plotters and supports all Macintosh software. Ideal for use with MacProject.

£99.00



MACTYPE™

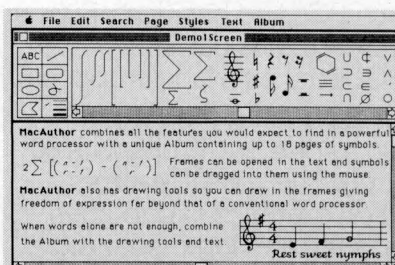


A true touch-typing instruction package combining time honoured teaching techniques, like a built-in metronome, and practice sessions using real words and phrases. MacType even rewards you with certificates as your standards improve.

£49.95



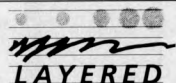
MACAUTHOR™



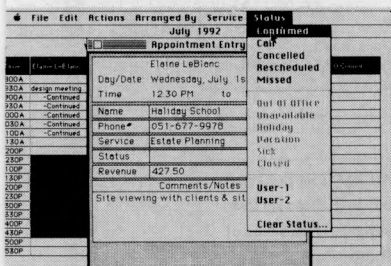
This outstanding word processor makes the most complex text preparation radically simple. MacAuthor lets you work on up to 4 documents simultaneously, and you can incorporate graphics and special symbols by means of built-in drawing tools and a graphics Album. MacType will be available very soon. Order now at this introductory price.

£169.95

PERFORMANCE OF YOUR MACINTOSH™



FRONT DESK™

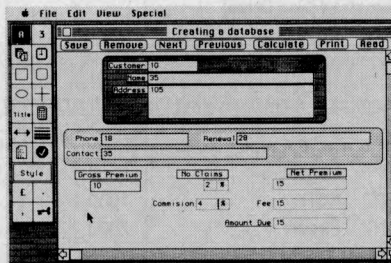


Front Desk takes care of appointment scheduling and time accounting for up to 15 different people, places or things. It can help medical offices to keep their doctors ordered, allocate conference rooms, for companies, control booking for health clubs and sports centres. In short, it's for anyone who has a lot to allot.

£149.95

L A S E R
SOFTWARE INTERNATIONAL LTD

LASERBASE™



Laserbase is a database system which uses the Macintosh environment to the utmost advantage. Features include unlimited fields, field sizes, record sizes, and unrestricted sort and selection specifications within the available disk space. Calculations are defined with a 'Quick Calc' Feature and graphic capabilities are also available for designing your forms.

£130.00

This Macintosh Software is easy to learn, practical in use and consistent in operation because all of these qualities are inherent in the Macintosh itself.

Each program is sourced from one of the most respected names in the software industry, so you can be sure that you're buying quality. Probe International is wholly dedicated to bringing highest quality software from around the world to the UK market.

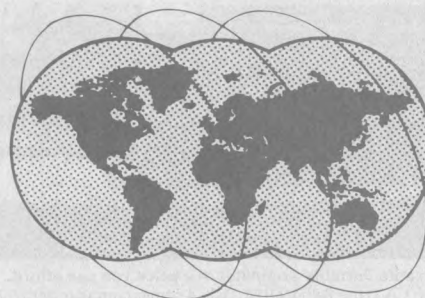
We are the **world's first** distributor solely dedicated to Macintosh products. Because we are the specialists, we are able to provide our dealers with outstanding product support, so you are assured of support yourself.

Why not call us now and we'll direct you to your nearest dealer where you can experience this exciting new software for yourself.

You'll never want to use anything else.

All prices are exclusive of VAT. Macintosh is a trademark licensed to Apple Computer Inc.

**Probe International, 80 Victoria Road, Widnes, Cheshire WA8 7RA.
Tel: 051-423 6666**



PROBE INTERNATIONAL
Searching the world for excellence

BIGGER STOCKS

GARWOOD IS GROWING!
(and you can reap the benefit)

CHEAPER PRICES

DISKS				DYSAN		3M		MEMOREX		BASF		HITACHI	
Price per box of 10			TPI	1-4	5-9	1-4	5-9	1-4	5-9	1-4	5-9	1-4	5-9
5 1/4"	S/S	S/D	48					15.60	14.70	14.60	13.70		
	S/S	D/D	48	17.25	16.20	15.10	14.20	17.10	16.00	17.60	16.50		
	D/S	D/D	48	25.30	23.70	20.70	19.40	20.60	19.30	21.50	20.20		
	S/S	Q/D	96	25.30	23.70	23.10	21.80	24.70	23.20	23.10	21.70		
	D/S	Q/D	96	31.80	29.80	27.00	25.30	27.40	25.70	26.80	25.20		
8"	S/S	S/D	48			16.80	15.75	19.80	18.50	15.20	14.30		
	S/S	D/D	48	24.70	23.15	21.75	20.40	20.80	19.50	20.00	18.80		
	D/S	D/D	48	29.30	27.45	25.05	23.50	27.10	25.40	23.80	22.30		
3" Compact (for the Amstrad Disc Drive)												36.00	33.80
3 1/2" Micro	S/S	D/D	135					41.80	39.20				

Disc prices are exc. VAT but inc. carriage. S/S = Single Sided D/S = Double Sided S/D = Single Density D/D = Double Density Q/D = Quad Density

RIBBONS supplied for most printers (including the Amstrad DMP1) Prices on Application

LISTING PAPER (plain or ruled) Priced per 1000 forms			Boxed	1-4 boxes	5-9 boxes	10+ boxes	
11" x 8 1/2"	1PT	60 gsm	2000	4.95	4.80	4.65	Listing Paper prices are exc. VAT. Delivery free within 20 mile radius of Brentwood. Carriage at cost outside this area.
11" x 8 1/2"	2PT	NCR	1000	14.45	13.95	13.45	
11" x 9 1/2"	1PT	60 gsm	2000	5.25	5.10	4.90	
11" x 9 1/2"	1PT	70 gsm	1750	6.00	5.80	5.60	
11" x 9 1/2"	2PT	NCR	1000	15.80	15.25	14.75	
11" x 14 1/2"	1PT	60 gsm	2000	7.30	7.05	6.80	

PRINTER OFFER - MT80 Matrix Printer 80 c.p.s. RRP £217 + VAT OUR PRICE £199 + VAT

COMPUTER COMPANIES formed with your choice of name - £85 + VAT (NO EXTRAS)

GARWOOD'S STATIONERY CATALOGUE - Full colour 224 pages - £1.75 inc postage

Garwood (Wholesale) Limited

45 Plovers Mead, Wyatts Green, Essex CM15 0PS ☎ Blackmore (0277) 823747



Dialtex-4

Wordprocessing and Communications
from TALBOT



A Truly Versatile Portable Computer at a price you can afford.

For just £685.00 (+ VAT) the Talbot DIALTEX-4 comes complete with INTEXT integrated Wordprocessing and Communication software and a slot-in micro-cassette drive for saving those valuable documents.

A wide range of peripheral equipment is available to enhance your system. An acoustic coupler lets the DIALTEX-4 communicate with other computers over the phone. There are battery powered printers for hard copy documents anywhere, anytime. There is a RAM Pack to extend the basic memory of 64K up to 128K. Other options are:- Cartridge Printer, RAM cartridge, ROM cartridge, Instrumentation unit, Item keyboard, Floppy diskdrives, External cassette.

For more information phone or write to:-

TALBOT COMPUTERS LTD.
293, Charminster Road, Bournemouth.
Dorset. BH8 9QW.
Tel: (0202) 519282

PHARMACY SOFTWARE

FOR APRICOT
£225.00

COMPLETE PACKAGE
Apricot printer and software from
£1,675

Rent complete package
from **£13.78** per week (less tax relief)
includes full maintenance, contract
and insurance

Also available for Sirius

SAN ENTERPRISE
2/8 MADRID ROAD
GUILDFORD, SURREY

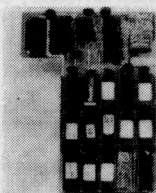
Tel: (0483) 578910
Dealer Enquiries Welcome

Electronequip

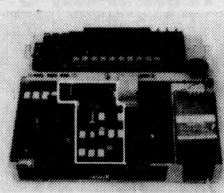
(Authorised BBC Micro Dealer, and Econet service centre)

ALL ITEMS ON THIS PAGE — MAIL ORDER OFFICE ONLY

SIDEWISE



SIDEWISE FITTED



"SIDEWAYS" rom board for BBC Micro.
No soldering required **£33.44 + VAT**

BBC SPARES

TTL

LS00.....	.40
LS10.....	.30
LS74.....	.46
LS123.....	.75
LS132.....	1.20
LS163.....	1.35
LS244.....	1.47
LS245.....	2.00
LS393.....	1.20
7438.....	.75

CMOS/ULA's etc

3691.....	4.92
88LS120.....	4.23
4013.....	.60
4020.....	.90
4816.....	2.90
7002.....	7.25
6522.....	5.22
LM324.....	.70
Video ULA.....	15.75
Serial ULA.....	9.45

ROMS

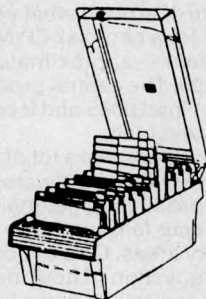
1.2 MOS Rom.....	6.00
BASIC II Rom.....	26.00
DNFS Rom.....	17.91
Full range of roms stocked	

Others

Keyboard.....	52.38
Keyboard swt.....	2.60
Cass Relay.....	2.20
BBC Power Supply.....	52.92

DISKETTES

Memorex 40T.....	18.00
Memorex 80T.....	28.00
Cleaning kit.....	8.65



DISC BOXES

10 disc library case....	2.50
30 disc Disc Box.....	6.00
40/45 disc Disc Box.....	16.48

UPGRADES

Acorn DFS.....	100.00
Econet.....	60.00
Speech.....	47.80
Memory 16-32K.....	20.00
Analogue input.....	14.00
Printer port.....	15.00
Serial.....	13.00

DUST COVERS

RX80F/T.....	4.56
FX80.....	4.60
BBC Micro.....	3.60

(VAT @ 15% to be added
to all above prices)

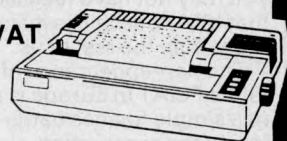
SOFTWARE SALE

most ACORNSOFT 2.99 inc VAT
MICRO POWER etc 1.99 inc VAT

*EPSON

RX-80FT £219.00 + VAT

FX-80 £316.00 + VAT



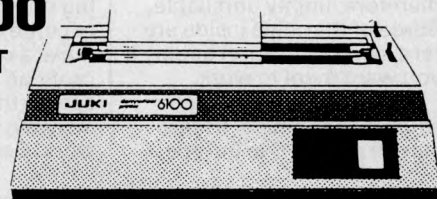
Printer pack includes paper & BBC cable £7.00 + VAT
Screen dump rom available for £10.00 + VAT

JUKI 6100

£325.00 + VAT

Sheet feeder

£189.00
+ VAT



VOLTMACE JOYSTICKS

*10% off list prices



Discounted price inc VAT

BJ VOLT 14	Voltmace Delta 14B Joysticks.....	13.46
BJ VOLTAD	Voltmace 14B/1 Adaptor Box.....	13.36
BJ VOLT 3T	Voltmace Delta 3B Twin Joysticks.....	17.99
BJ VOLT 35	Voltmace Delta 3B Single Joystick.....	11.95

All offers subject to availability
Prices subject to variation without prior notification
Postage 46p. Securicor £4.90 (per parcel)
TRADE, EDUCATIONAL & HMG ORDERS WELCOME
Access & Barclaycard Accepted
Large Stocks — 24 Hour Despatch



MAIL ORDER ENQUIRIES TO BELOW OFFICE

BBC

Electronequip

36-38 West Street, Fareham, Hants (0329) 230670





Where does IBM do its shopping? What do you know about Sir Clive Sinclair? Is the home market finished? Guy Kewney's been hot on the news trail.

Fooling yourself

You may not realise that IBM has to buy its equipment from IBM, like the rest of us. Worse, you may not have realised that IBM doesn't like it any more than the rest of us.

The non-appearance of IBM's PC/AT in Europe is due to a simple finance battle inside the corporation.

The computer itself is known to be difficult to build. The disks, for instance, are rather advanced and, therefore, highly unreliable. Some of the chips inside are rare, and still in short supply if you want them to work.

However, IBM has been counting the cost of its late launch of the PC in Europe,

and angry words have been expressed by European executives to their American counterparts who couldn't release sufficient PCs to supply buyers over here. Even when they did, it will be remembered, there was a shortage of some kind.

So it was decreed that the AT would be supplied to Europe as well, at a certain price. And it would be sold, at another price, dangerously similar to the first.

European executives, having cast their eyes over the price list (not for divulging to us outsiders) have sent back memos, the broad gist of which is: Thanks very much and all that, but if you want big orders, the price will have to come down. We have to make a certain amount of profit on each million we spend, they said. And anyway, the things don't work. Get your fingers out.

It's a rich man's world

Thriving on editorial diversity is the motto of this particular story. My original intention was not to report on Sinclair's C5 vehicle: apart from commenting wryly that it's truly amazing, how many computer specialists have gone into print with their opinions on the thing?

The editor, however, disagreed. Hence the picture story which appears later in this column (and which, I hasten to add, was written by someone with more knowledge of cars than I have).

While the vehicle may be of interest because of the Sinclair connection, I have to add that Sinclair worship is a strange phenomenon. I think this fascination with the hobbies of a rich man is a symptom of the moribundity of our civilisation (I'm going to get into *Private Eye's* Pseud's Corner if it kills me).

My argument runs something like this: if Sinclair takes his sponsorship of orchestras further and writes a symphonic opus, will the motoring specialists join in with the computer writers in producing criticism? And can we now expect the athletics magazines, who cover the marathon runs that Clive specialises in, to start reporting on the computer industry?

Sir Clive has many private interests. He is a poetry freak. He has tried his hand at publishing novels. He's a leading light in the IQ club, Mensa. He has political and social theories. And he has given evidence, on the one or two occasions when I've met him, of an interest in women, and in alcohol.

The editor permitting, none of these subjects will become the object of anything more than passing, humorous comment here.

Did you know, by the way, that the vehicle isn't even produced by the same company that makes the computers? Sinclair Vehicles Ltd is a separate entity from Sinclair Research. And the only possible interest to users of microcomputers is this: if

the car business drains Sinclair's money away, then he may not have the cash to plough back into the next generation of micros.

Switched on

While everyone else is trying to buy cellular radio phones to prove their status (as travelling salesmen?) I've gone one better and installed my own PABX.

There are lots of private branch exchanges on the market these days, but the trouble with most of them is that they require special telephones, or a switchboard operator, or both.

The Small Systems model, the SS12, uses plain vanilla phones and, more important, uses only two wires.

The reason these two facts are important is that I have several computers in my office, and need to connect them to the phone system through modems.

On all too many systems which try to offer inter-office switching without a switchboard console, they have to install extra wires to carry control signals. Alternatively they use special tones which a computer could accidentally duplicate. Either way, to attach computers to the phone system you need a new, special line.

The system comes, complete with wiring for twelve 'lines', at a package price of around what you'd pay for a two-disk CP/M system — approximately £1200. The central processor is an Intel 8085 and it controls all switching.

It sounds like a lot of money for very little hardware, but the problem of getting it cheaper falls into two rather tricky areas. One, of course, is the question of how many you can sell, and this is still not a mass market.

Systems like the SS12 may change all that, but not unless everyone can afford them. And as long as it takes two years from original design to approval, the sheer bank overdraft problems of designing a unit make the prospect of cheap ones rather remote.

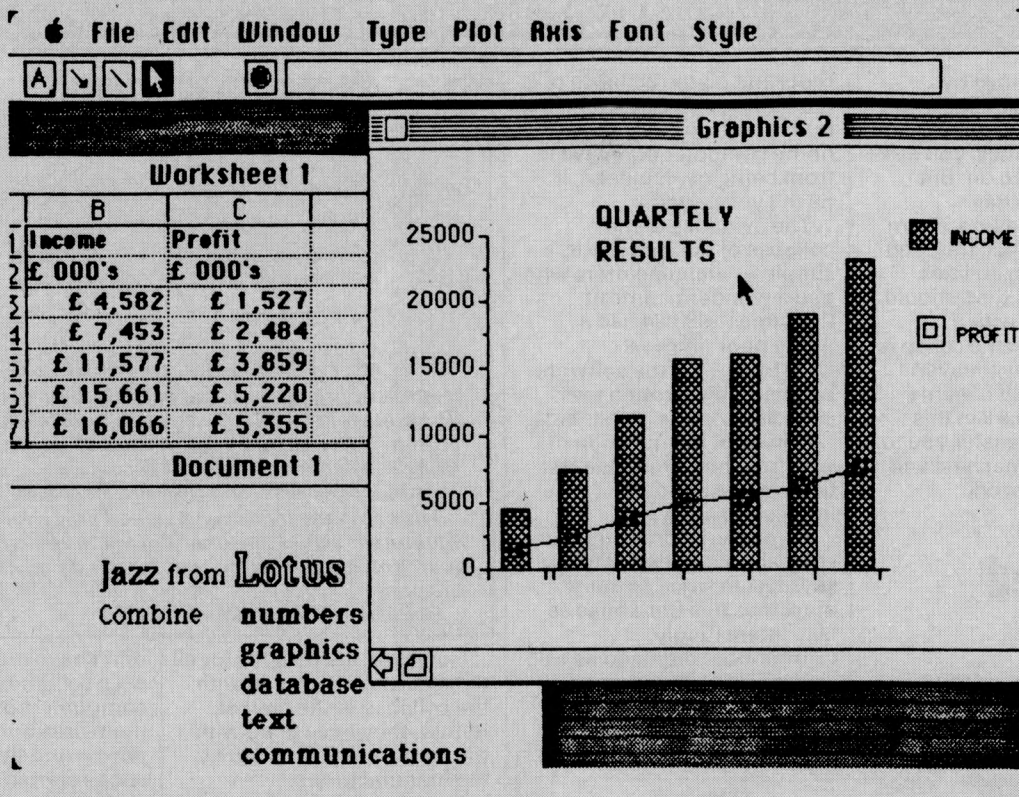
The nice feature of the system is that you don't have to have hundreds of lines to



I first reported on Texas Instruments' Pro-Lite in January, but details are available now of when — and for how much — the portable will sell for in the UK.

Obviously inspired by the occasion, the company sent out a selection of photographs, including the one above which also features a Microlite aircraft.

Prices of the portable, excluding the aircraft, start at £2995, and US imports will be available in March followed by UK versions in May.



People will tell you that Jazz is the product which Lotus hopes will be as popular on Macintosh as 1-2-3 was (is) on the IBM PC. Lotus is right.

The company will also tell you that it's a version of Symphony, the follow-up IBM product, but for the Macintosh. There, it will be wrong.

The new product is superficially like Symphony in that it includes a proper database (1-2-3 had a rudimentary file searcher), a full-featured word processor (not just a pad scratcher) and also includes graphics and communications.

But where Symphony is a single database, with a series of different 'interfaces' to interpret the data in graphic, or spreadsheet, or text, or database mode, Jazz is actually five programs, integrated with automatic (but cancellable) matching.

In other words, a spreadsheet in both Symphony and Jazz can be arranged so that data displayed in graphic mode will automatically change if you change the spreadsheet.

But in Symphony, the change arises as soon as you ask for the display change in the graphics. In Jazz, the graphics program has its own file, and gets changed only when the changes are passed over from the spreadsheet. And it's possible to retain the old data, give it a new name, and file it.

The product will make a lot of difference to the Mac.

With Symphony, the change from 1-2-3 to the new product was not clear-cut enough for many commentators. All they saw was the complexity, and wondered aloud whether anybody would buy it. To the users, however, the additional database capabilities, plus the comms function, was enough to justify the switch.

With Mac, however, there isn't a 1-2-3 product to compare it with, and users of the computer will compare its five functions with separate spreadsheet, word processor, and so on.

To Mac users, no more need to be said.

Those of us who know (and love) the machine are still driven mad by the thoughtful, painstaking, nit-picking and endless way it refuses to be hurried while sorting out its disk drives. To switch from one application to another can take as little as half a minute, or as much as a minute and a half, if there are complex files to open and close.

The prospect of being able to switch from editing a letter, into sending an electronic mail version of that

letter, into storing the reply in the database, into getting on with the spreadsheet work you stopped to write the letter in the first place — well, it's like magic.

Or at least, it will be if Jazz lives up to its promise.

The launch of Jazz in the UK in January was a pathetically low-key affair compared with the razzamatazz we saw in Las Vegas in November.

In Vegas, we were in an aircraft hangar because there wasn't anywhere else big enough to accommodate the cinema screen, the aeroplane (what was that there for?), the crowd of 300 important and self-important people, and the tables groaning under a load of glassware and crockery and floral arrangements. And the real live jazz combo (a big band) and jazz singer, of course.

In London, we were stuffed into a Park Lane Hotel room and made to watch the video of the jazz combo, and a Lotus executive did a demo of Jazz on a giant mockup of the Macintosh, six feet tall. (In Vegas, there was a 12ft tall working model. Ah well.)

But we did have more impressive news here in London — the news that Apple is extending its Test Drive program to include Jazz.

The idea, according to Apple boss David Hancock, is that the test drive schemes will become more directly aimed at specific markets. And in April, the specific market will be the Jazz market, and people who borrow the machine overnight will get Jazz to play with.

One question which is being asked a lot is simply: Will it sell? And, more specifically, will it sell better than Symphony?

The Symphony problem is largely in the mind. There are those who think that Symphony requires a degree in computer science to understand. And there are those who mutter, darkly, that it has 'fopped'.

It's always possible that Lotus executives tell me fibs from time to time, but I haven't caught them at it yet, and they claim that, in Europe, Symphony sales are running level with 1-2-3 sales.

This means that IBM users are actually buying more copies of Symphony than of 1-2-3. The logic is simple: there are more lookalikes in Europe than in America, but Symphony is not yet available for most lookalikes. Lotus 1-2-3, however, is. So a large proportion of 1-2-3 sales are for the lookalikes, and very few of the Symphony sales will run on them.

As to whether Jazz will sell, I feel very happy sticking my neck out and saying 'Yes, very well indeed'.

use one. If you have two incoming Telecom lines, you can have 10 extensions. With three Telecom lines, you can have nine, and so on. But every extension has programmed dialling, alarm calls, intercom facilities, and put-you-through abilities.

Which means that, should you ring me up with a complaint about the collapse of your company (heaven forbid) as a result of some throwaway remark in this column, I can transfer you to the answering machine and get on with my work.

Unfinished business

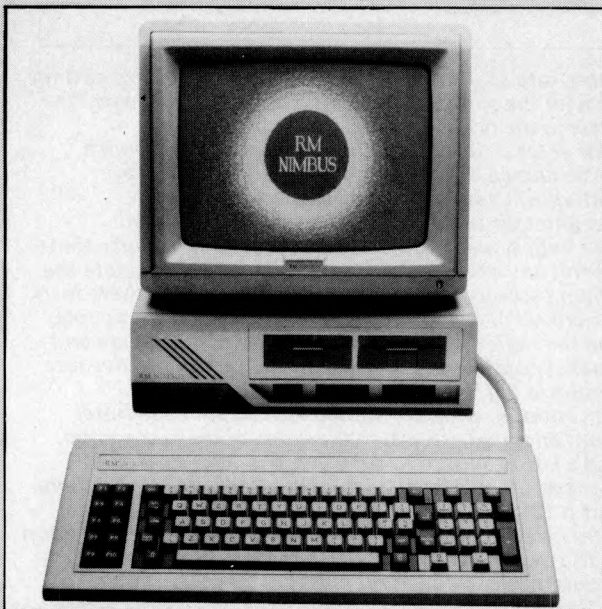
Attentive readers of the *Sunday Times* will have noticed that newspaper

reporting on the collapse of the home computer market. It is, it reports, over. But the home computer boom is far from being over. Indeed, it hasn't yet started.

The evidence of the collapse of the industry is simple — manufacturers who had a wonderful time at Christmas 1983/84 had a pretty poor time last Christmas. And the software business had a rotten year, especially on the games side.

However, the question of who had the rotten time last Christmas has some interesting answers.

Primarily, Acorn caught a cold, although the company says it sold twice as many machines this Christmas as last. Interestingly, Commodore didn't do as well as expected. And, despite all the predictions of doom, Sinclair did rather well.



Research Machines, whose Z80-based systems must be familiar to many of PCW's educational readers, has expanded into the world of 16-bit computing.

Based on Intel's 80186, its Nimbus range uses MS-DOS along with MS-NET networking, and an input/output system known as Piconet. MS-NET allows up to 64 'Nimbi' to share software and network facilities, while Piconet allows up to 30 peripherals to be driven by one I/O port.

As the Intel chip runs at 8MHz, the system is likely to be speedy. In fact, Research Machines has run the PCW Benchmarks and says the Nimbus beats all but the Sage from our January round-up.

The machine will be available in March, and an entry-level system, with a single 3½in, 720k capacity drive, costs £1395. For many educational customers the price is lower — £945. The twin drive version costs an extra £300. These prices exclude VAT and the cost of the monitor.

Hard disk versions and extras such as a mouse will also be available. At the time of writing few details of applications software were available, but PC Paint is a certainty and a wide range of business packages is promised.

More details on (0865) 249866.



It isn't altogether accurate of Servicon to say that its diskettes for the BBC Micro have 'broken the £130 barrier.' After all, the price of £129.95 doesn't include VAT. They have their own Crescent DFS, giving 400Kbytes per disk, and they are 3in drives.

The company has also launched a club for users of its equipment called the Inner Circle Club (!) costing £25 per year. You get five games per month on disk free (?) for the price.

Details on Cheltenham 583391.

However, the reasons for all this have nothing to do with the collapse of the market. Rather, they have to do with the neglect of the market by the manufacturers.

Clive Sinclair, uniquely in Britain, did launch a new machine with noticeably more features than his old one. The QL excited people and they bought it, even before it existed. Afterwards, fingers burned, they held back a bit — but by Christmas, all the chain store buyers were assuring me, the QL was selling again.

Commodore launched the Plus/4. It wasn't noticeably better than the 64, and it didn't run 64 software. It was sufficient to put some buyers off the 64 (out of date? they asked themselves) but not enough to swamp the market with its excitement.

Amstrad did pretty well, just launching a machine which brought the 'value for money' level into a different bracket.

To put it politely, the Amstrad is not very far removed from a souped-up Sinclair Spectrum with a proper operating system, a built-in tape player and a free monitor. But the free monitor was a new, even exciting, thing to get for £250 including the computer.

Acorn, complacently sure of its school sales, refused to change the BBC Micro or bring the price down. Yet it must be obvious to the most ignorant that the cost of building it had halved in the three years since it was first available, and that if it had been re-engineered it could be built for closer to a third of the price.

Now, the schools scheme has come to an end. Schools

don't have money without such schemes — certainly not computer money. Many of them are short even of writing paper. And the result is that shops started dumping BBCs at discount prices. But the reason they started dumping them wasn't just a fear of not being able to sell them.

Around the beginning of December, rumours of the Issue 10 version of the BBC board began to circulate. It would, said 'informed sources', sell for £150-£170, and Acorn would stop supporting the old one.

Shopkeepers who weren't quite sure if this made sense still knew enough to move out of the firing line. If a new model is coming out, they reasoned, now is the time to get shot of the old, even at cost — or even at a loss.

So they did.

The fact of the matter, however, is that no-one, yet, sells a home micro.

What has flooded the market, to the point where potential buyers mostly already have it, is a programmer's exercise bike, usable for sophisticated games. For home use, it's a joke.

How can you manage your history notes on a system with only 100k of data? And if you log on to a remote database with history information, you can't compare it with your own notes to see if they relate because the comms program is separate from the text program.

How can you organise your appointments — a trivial 10-second function with a pocket diary — when it takes five minutes to load the diary program from cassette? And when you can't find the data

For every business problem we've got a digital solution



ACT Sirius 1 available from £1799.



Fortune available from £4070.



Apricot available from £1790.

From the smallest to the largest application our knowledgeable staff will provide the most efficient and cost-effective solution from our comprehensive range of six computers, fifty makes of printer and several hundred software packages.

Our leasing schemes save the burden of capital cost and our new interest-free credit plan offers even greater savings.

Call us today for advice – or send for our price list. You will find the service you expect from a leading computer company.

Digital Solutions Limited
The Coach House, The Broadway, St Ives
Cambs PE17 4BX
Telephone Huntingdon (0480) 300728

digital solutions 

digital™

IBM

FORTUNE

FUTURE

Demonstrations available on new Apricot range



Pick one.

COMPAQ® IS A REGISTERED TRADEMARK AND COMPAQ DESKPRO® IS A TRADEMARK OF COMPAQ COMPUTER LTD. IBM® IS A REGISTERED TRADEMARK OF INTERNATIONAL BUSINESS MACHINES. UNIX® IS A TRADEMARK OF AT & T BELL LABS. © 1985 COMPAQ COMPUTER LTD. ALL RIGHTS RESERVED.



Or have it all. Now.

The COMPAQ DESKPRO® is available now.

Now you don't have to compromise to have it all in a personal computer.

Especially as the COMPAQ DESKPRO is the only computer you can upgrade from IBM PC to XT to AT levels of functionality – easily, affordably, compatibly.

Configure it the way you want; with one or two diskette drives. One or two fixed disk drives.

Or new options like a 30M-byte high performance fixed disk, high speed 8087-2 co-processor and internal tape backup for either the 10M-byte or 30M-byte fixed disk.

UNIX®-based operating systems? We run them today. PC DOS Version 3.0? That too. Networking?

Can do. Multi-users? No problem. Multi-tasking? Easy. Tape backup? It's inside. High resolution text and graphics? Standard. Two speeds? Exclusive.

Pick COMPAQ DESKPRO over a PC or XT and you get more performance for your investment.

Pick COMPAQ DESKPRO over an AT and you get comparable performance for a lot less investment.

With a COMPAQ DESKPRO, you have it all.

Check it out with an authorized Compaq dealer or contact Neville Jacobs, Compaq, Ambassador House, Paradise Road, Richmond, Surrey TW9 1SQ. Tel: 01-940 8860.

COMPAQ®

IT SIMPLY WORKS BETTER.

DESKPRO®

JUKI 6300 - Unbeatable at the price

How many times have you heard that? We thought so.

Manufacturers' opinions are all too often, shall we say, a trifle optimistic? Not this time.

The brand-new Juki 6300 is simply the most powerful and versatile daisywheel printer at the price. Take a look at the features.

[6300 features]

- standard DIABLO* 96-character daisywheel ■ standard DIABLO* hytype II ribbon
- 40 characters per second ■ 3k buffer memory (expandable to 15k) ■ fully compatible escape sequence codes with DIABLO*630 API ■ proportional spacing, 15, 12, 10 pitch ■ operational noise level of less than 60 dB ■ comprehensive, easy-to-read User's Manual

Now look at the price. Just £ 799. It must be the best value on the market.

(Except, perhaps, for our model 6100, which uses the standard IBM* Selectric II ribbon and costs precisely £ 399).

We may be the latest name in information technology, but our philosophy is as old as the hills.

Roughly translated, it means outstanding value for money.

Or, to put it another way, Juki means business.

* DIABLO is a trade mark of Diablo Systems Inc.

* IBM is a trade mark of IBM Corporation.

JUKI

Technology true to type

JUKI (EUROPE) GMBH · Eiffestr. 74 · 2000 Hamburg 26 · F.R. Germany
Tel.: (040) 25 20 76 · Telex: 2 163 061 (JKI D) · Fax.: (040)

Sole distributor: **Micro Peripherals Ltd** Intec Unit 3, Hassocks Wood, Wade Road, Basingstoke,
Hants, RG 24 ONE. Tel.: (0256) 47 3232 (32 lines)
Telex: 859669 MICRO PG, Facsimile: (0256) 46 1570



JUKI 6300
(Daisywheel Printer)



When the rumours first emerged about Hewlett-Packard releasing a Unix-based portable, a few eyebrows were raised. But it all turns out to have been true.

Dubbed the Integral Personal Computer, the 68000-based machine weighs 25lbs and includes a built-in Thinkjet printer and 3½in, 710k capacity disk drive.

The screen provides 31 lines of 80 characters on a 9in electroluminescent amber display. HP Windows is included and allows the multi-tasking system to display several applications simultaneously. Surprisingly though, it's a single-user system.

The operating system is Hewlett-Packard's UX, derived from Unix System III, as is Xenix which is due to be available on IBM's PC/AT this year.

Also included is Personal Applications Manager, which may help to appease Unix opponents as it allows you to access the machine without having to use standard Unix commands.

The £5450 Integral is aimed primarily at scientists and engineers, but standard business packages such as Multiplan and dBaseIII can be implemented. Availability is scheduled for March.

files?

Who is going to use his £400 micro to turn light switches on and off when that means he can't play Elite or Son of Bigger or Manic Miner?

When computer memory costs £200 for a half megabyte, why are people launching systems with 48Kbytes? Why, when there are chips that can control 16Mbytes, are people offering systems that get lost beyond 64Kbytes? When autodial modems could be built in for £50 extra, why are the computers not even fitted with sockets into which a modem can be plugged? When processors can run four levels of program protection, why are they not given proper multi-tasking operating systems? When display tubes can accept data at 10MHz, why are they sent data down a serial wire (which doesn't actually exist except in the mind of the designer) at 9600 baud?

The answer isn't simple. It has to do mainly with our

general failure to understand that computers are fundamentally the most useful tools, after the invention of writing, known to civilisation. And also with our business expectation of a 'stable market' in an area where the technology is constantly causing earthquakes.

Selling a BBC Micro for £400 in 1985 is an act of simple dumb negligence. The fact that selling the BBC Micro is possible is a dead giveaway of the fact that its rivals have been equally negligent.

That machine was the most exciting design thought of when it was announced. It was still exciting when it became available, many months later. But only somebody who had never looked at a silicon chip could possibly imagine that, today, it is anything other than out of date. And so is the Apple II — but at least Apple has re-engineered it twice. So is the Spectrum, but at least Sir Clive has given it a better keyboard (sort of).

By the end of the year, the Macintosh will cost £1000, its Atari rival previewed in this issue will be available, and there will be one or two interesting machines like the Mind Set and Amiga, and others we haven't heard of yet because they are still secret.

If those machines show no sign of creating new markets, then I'll consider, seriously, the possibility that the home computer boom is over.

As of today, however, I'm still waiting for it to start.

Any offers?

Now that Coleco has killed off its Adam micro, we will never know whether it failed because the design didn't appeal to enough people, or because they never managed to build any that worked.

However, the company (now concentrating on cabbage patch dolls) does still have a computer product up its sleeve — a phone which runs Apple II software.

The plan is to sell this for £500, but the plan isn't Coleco's. That company hopes to find a sucker — sorry, buyer — to take over the design.

Sneaking suspicion

Tactless though it was of Timefame to allege foul play and unauthorised hacking of its Prestel pages, I'm stunned

that Prestel could get away with the response it chose — to delete Timefame's pages altogether.

The fight blew up just before Christmas, when Timefame announced that hackers had been playing with its pages (which nobody need doubt) and worse, that these hackers had been given the necessary access codes by a 'mole' inside Prestel.

Who can say whether this is, or was, true? Certainly, Prestel couldn't prove it one way or another, and neither could Timefame. And eventually, Timefame withdrew the claim.

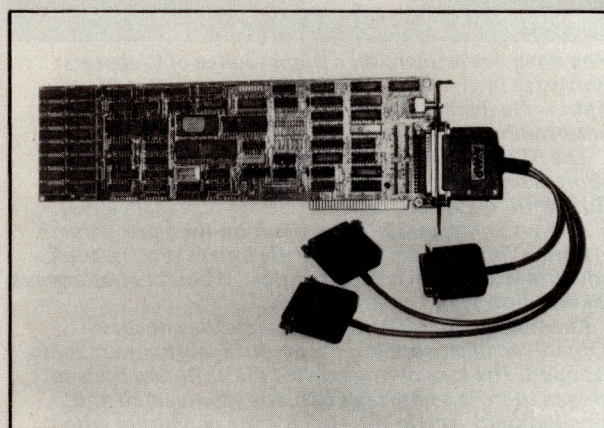
But the rest of us would find that withdrawal just a wee bit more convincing if Prestel hadn't put such extraordinary pressure on them.

If Prestel feels entitled to censor pages published by users of its service, it is going a lot further than it said it would when it announced the service. And it's going a lot further than the free press laws (such as they are) would allow it to do if it were a newspaper print works.

But to suspend the Timefame pages because of unflattering remarks is quite another thing.

I know that there are print unions which take similar action (and get away with it, sometimes) when their paper prints things about them which they regard as unfavourable.

But I'd be very surprised to learn that the people running Prestel are the type who



It wasn't all that exciting for the rest of us (who don't have Hewlett-Packard 150 micros) to learn that three of them could be connected by Protek's card to share a printer or plotter.

But the news that the card will now work with the IBM PC makes it rather more generally useful. And since the other two computers need only take the printer cable, they can be something else — as long as it has an IBM-style socket.

Details on (01) 245 6844

praise the print workers for that kind of high-handed action.

Apart from the arbitrary damage to Timefame's business, what about the subscribers? Aren't they entitled to the information — which, just possibly, might be important — that they want to look up?

And just suppose — just suppose, that's all — that Timefame was right, after all, and there was a mole, and Prestel was at fault?

It's irresistible

They are rather pleased with themselves at Digital Research, where the company reckons it's beaten IBM to the punch with a 'proper' operating system for the AT.

Concurrent DOS 286, launched together with Intel (which makes the 80286 super-chip inside the AT) does something that the AT's own operating systems, DOS 3.1 and Top View, can't do.

It extends the memory

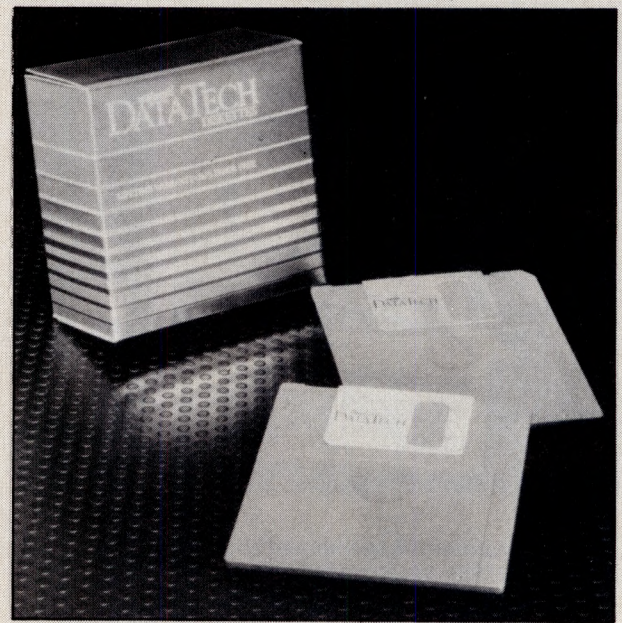
beyond a megabyte.

The 80286 operates in three modes. At startup, it behaves very like the original 8086 or 8088 inside the IBM PC. It addresses a megabyte, maximum, of internal memory, and it controls it in segments of no larger than 64Kbytes.

But it can be switched to 'protect' mode. In this mode, it can suddenly control 16Mbytes of memory (and the PC AT does have the necessary wires to plug all that memory in) — and can give different programs different 'privilege' levels.

The most privileged level, zero, is reserved for the operating system. It can decide which program runs in which part of the memory, and which bits of memory are not RAM any more, but ROM, or which bits can't even be read because they are secret. No other program can change these protected segmentations.

The result is that computers like the AT, the Acorn Business Computer, Rair,



The arrival of a Wabash Sony-style diskette is actually something of a breakthrough, because this one is really made by someone else. Most diskette material normally comes from one of three factories in the world, whatever the hype on the advertising box.

Wabash claims that this half-megabyte 3½in system uses a new surface technology. 'It is the first Wabash product,' says the company, 'to use the cobalt-enhanced oxide coating formulation for high density recording.'

Theoretically, this should mean that when disk drives are formatting diskettes to higher densities, these Wabash ones will cope with the new format programs.

Details from 1 Trinity Square, Chelmsford CM3 5JX.



You have never seen Clive Digby-Jones of Websters Software (a distributor) before, have you? But it's all right — he doesn't always snarl like this when entertaining ex-Transport Ministers.

The MP, David Howell, gave Websters a chance of some publicity by inspecting its new premises at Guildford (for where he is the sitting representative).

And what fascinating conversation took place then?

Digby-Jones, entertaining little imp that he is, took advantage of the occasion to quip: 'Websters has always taken a firm stand against piracy.'

Keeping them rolling in their seats, he chuckled: 'Organised illicit copying of computer software must be stopped. The loss of revenue for the software houses means there is a shortage of funds for research and development, and in the end, it's the consumer who loses out.'

I think he was trying to encourage Howell to vote in favour of the forthcoming Bill against software piracy. It's hard to be sure, because Howell's only recorded words were: 'I'm very impressed indeed, Websters is obviously in the frontier of computer technology,' and added: 'It is in the nature of things that you cannot prevent ordinary copying any more than you can stop book lending. But you can prevent the actual duplication and then re-sale of software under fraudulent labels.'

FTS, ICL's 286-based micros and others (still secret) can now run multi-task, multi-user programs, and the users of the AT who stick with Top View and DOS 3.1, can't.

When the software is available from Digital Research in April, it will actually run DOS 2.0 programs direct from the disks; at the moment, the company's latest version of Concurrent will read DOS 2.0 files, but not run programs.

Most IBM watchers now agree that Top View is more than just a 'cosmetic overlay' to DOS, and is a genuine multi-tasking operating system.

But it doesn't have the multi-user, networking abilities of Concurrent DOS, and, even stranger, all the evidence is that IBM doesn't propose to upgrade it to that level for several months — possibly, not until next year.

And strangest of all, it only gives the AT access to the 640Kbytes of memory that the PC has today. It doesn't use protected mode at all,

The only thing that is still far away on Digital Research's travel plan is the networking parts of DOS 3.1. The company says it hopes to

incorporate that this year, but not at the release of Concurrent 286. But it will announce DR Net in a version to work with Concurrent 286 in April.

Working with the already-announced GEM, this new operating system could start the transformation of the AT into a super-Macintosh.

The segmentation and protection abilities of the 286 chip go some way beyond the powers of the 68000 chip as used inside the Macintosh, especially with the current Mac operating software.

However, there will be interesting announcements on that level in 1985 too. Concurrent DOS 68k is likely to be announced in the next few months, giving multi-tasking to many systems with the 68000. And a Mac version is one that Digital Research will find hard to resist.

Bridging the gap

Eagle has side-stepped the threat of Chapter XI bankruptcy in the States by rescheduling its debts.

The company's imitation IBM micros have never quite recovered from the blow of a lawsuit from IBM over the

MORSE: THE TOP TEN SYSTEMS



Value



Advice



Software



Printers



Support



1

IBM Personal Computer. The World's best selling Personal Computer, as well as ours. We have an extra special offer on our 2 x 360K, 128K PC "Starter Pack". We've cut the price from £2116 and included the easy to use Pfs Write word-processor as well as the fast NEC 8023 correspondence quality printer, cables, disks and paper. **SAVE £650 ON NORMAL PRICE!**

This package: computer, printer, software, accessories, only **£1990**

2

IBM COLOUR PC. This 128K system comes with colour and graphics display. It's great for Lotus 1-2-3, Framework or Flight Simulator, and to start you off, we're supplying this £2524 system with **printer, word-processor, spreadsheet and accessories in one package.** For entertainment, we're also giving MicroSoft's Flight Simulator. We think no other Authorised dealer matches us for price and support. **SAVE OVER £660!**

£2490

3

IBM XT. The 10Mb Winchester version of the PC. If you want a large database or accounting suite, or just use a lot of information, a hard disk is essential. Morse have managed to break the £3000 barrier, and on the 128K RAM, monochrome package you can **SAVE £440!** IBM XT now:

£2990

4

COMPAQ DESKPRO. All you ever wanted in a computer is in this new superfast machine. It has 640K RAM, 10Mb hard disk and internal tape backup controlled by the fast 8086 chip. Morse supply it with **FRAMEWORK and NEC printer at NO EXTRA COST, SAVING £970!**

£5595

5

COMPAQ PLUS. Compaq Portable + 10Mb Winchester = strength + value. This 256K computer has a reputation for being really tough - the hard disk can be dropped even when working. We offer the Brother HR1 heavy duty daisywheel printer & RS232 adaptor worth **£612, free!**

£3945

6

COMPAQ PORTABLE, the No.2 PC in the U.S., and the best of the compatibles. With 256K, unique graphics and text display, dual 360K disk drives and of course, portability, the Compaq is great value. To get you started, Morse give you at no cost, **WordStar and disks - saving £320.**

£2195

7

APRICOT Xi. Superfast and super powerful 10Mb version of the Apricot. Full hard disk computing at exceptional value. With the Xi, Morse are **giving away the Brother HR1** daisywheel printer and free word-processor and spreadsheet, etc. **saving £525.** In matt black:

£2990

8

APRICOT PC. Compact, powerful, friendly, British. This hugely popular system now has Lotus 1-2-3, Symphony and many other programs available. **SAVE £300!** High demand has allowed us to prune the prices to £1690 for twin 720K disks, and now on twin 315K disks:

£1490

9

APRICOT PORTABLE. The computer you can talk to! Remarkable piece of technology with flat liquid crystal display and speech recognition. 256K as standard, 720K disk drive, loads of software, all in a 12lb. pack. Morse can supply it from stock. **With FREE £95 MOUSE!**

£1695

10

APRICOT F1. Incredible value full specification business micro. Bright colour display, 256K memory, 720K disk drive, infra-red cordless keyboard. Bundled with word-processor and spreadsheet. In stock now.

NEW LOW PRICE! (Mouse £95) £995



IBM PC-AT

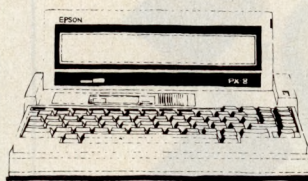
IN STOCK NOW at Morse, IBM's newest Personal Computer, the IBM AT (Advanced Technology). With the Intel 80286 chip controlling up to 3 megabytes of memory, it's easily more powerful than any of the competition.

PC AT Base model. 256K RAM, 1.2 megabyte disk, mono display, keyboard and PC DOS 3.0: **£3376**
PC AT Enhanced model. 512K RAM, 1.2Mb disk drive, 20 megabyte hard disk, mono display, keyboard and PC DOS 3.0: **£4706**



MORSE SOFTWARE

Naturally we're experts on **SYMPHONY** (£550) and **FRAMEWORK** (£550). Compare them at Morse. New on our shelves - **WORDSTAR 2000.** 21st Century word processing for £440. **SIDEKICK** utilities, making a dent in the charts at £49. At last! The **Whole Earth Software catalog.** A must for buyers: **£8.95**
TELEVIDEO Tele-PC Full IBM PC graphics (list £1990) only **£1690**
SANYO MBC 555 colour MS DOS computer with 160K disks, WordStar etc. **SAVE £119! £880.**



MORSE PORTABLES

Selling like hot cakes, the 64K **EPSON PX8.** Lap-held CP/M, with 80 column LC display, WordStar, CardBox, Calc, diary etc only **£795**
NEW! EPSON P80 portable printer, 3 1/2" battery disk drive. **EPSON HI 80** 4 pen plotter **£399**
CASIO FP200 portable computer. Basic, CETL etc, (list £299). With **FREE** £35 database and other software, at Morse only **£230**
CASIO PB700 pocket computer with Basic & graphics (£110) **£86**
Plotter, tape, expansion, available.

SURPLUS

From our surplus, used and ex-display stock. Call for details on these and many other items.

SURPLUS - BUT BRAND NEW!

TELEVIDEO TS803 CP/M, with word-processing, spreadsheet and superb graphics software (list £2095) **£490.00**
TELEVIDEO TPC1 Portable, CP/M, software as TS 803, (£1695) **£1290.00**
HYPERION PC Portable MSDOS, 256K, IBM PC compatible (£2566) **£1495.00**
EPSON MX100 III (£450) **350.00**

NEW IBM PC SOFTWARE

VisiCalc (£207) **140.00**
Ashton-Tate Friday! (£190) **152.00**
Advanced DBMaster (£494) **330.00**
VisiFile (£207) **168.00**
Pfs File - database (£116) **78.00**
Pfs Report (£104) **70.00**
dBASE II IBM (£335) **235.00**
Context MBA (£578) **235.00**
DEC Rainbow 100 software **Phone**

Many more too numerous to mention. No Mail Order on ex-display items. All Morse prices exclusive of VAT at 15%

MORSE

MORSE COMPUTERS 78 HIGH HOLBORN, LONDON WC1V 6LS. 01-831 0644. TELEX 916509.

close similarity of its internal software to IBM's own, and from a year ago, when it was the darling of American journalists, to today, is a big, big gap.

The plans for future money-making apparently centre on 'vertical markets' and overseas sales.

It's all in the game

At last, I have seen a computer downloading software from a video disk.

It's the new MSX design from JVC, linked into the VHD disk system and likely to hit the market later this year — much later.

The idea is that you can mix the picture from your computer with the picture from the disk player, and decide which film sequences to show under software control.

It looks like a first step, though.

The demonstration games shown at JVC's headquarters in London included the predictable car racing game, where the picture switches from one lane of a motorway to another as you twitch the

joystick. The computer makes it more entertaining by dumping oil barrels into your path.

But the loading of software seems to have been designed by a contemplative monk.

Data for the computer is stored on the video disk — how, the executives weren't too sure. But it comes off the video disk at the blinding speed of around 2400 baud.

Ah, well, back to the drawing board. With something like four gigabytes of data possible on the disk, it would take around 5000 hours to read the whole disk at that rate. You can see that this is not a computer peripheral.

The interesting feature of the machine was not its data rate, however, but the games. Apart from the racing game, most of the demo games involved audience participation and an expert bookkeeper.

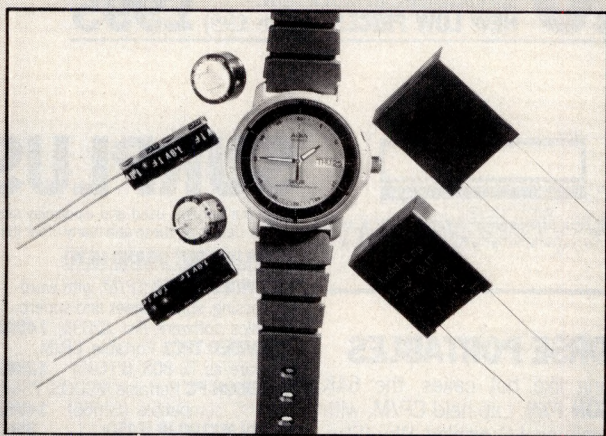
Executives told me that Japanese players love to sit round the screen, watching a fruit machine rolling. The audience watch the screen until the fruit is just about to settle, and then they have bets among themselves.

Alternatively, they watch a young man with a mischievous disposition



Roughly £100 below the nearest competitor, Prism's special monitor for the QL is priced at a penny short of £200, including VAT. I arranged to borrow one in order to test some QL software (yes, there is a program you can load other than chess) and it arrived promptly, and I'd tell you what it's like if only Sinclair could arrange delivery of the QL...

According to Prism, the screen is one of three designs — including Kaga's and the MicroVitec — which will display the full width of the 85-column width output of the QL. Ordinary colour monitors will cut it short. Details on (01) 253 2277.



You are looking at an actual farad. A farad is the unit of storage of electrical charge, and most students of electronics, having discovered the surprising fact that two nearly-touching metal conductors can store a charge, are usually disappointed to find that most capacitances are measured, not in farads, but picofarads.

These are capable of storing thousands of times more power than most capacitors, and Panasonic, which makes them, reckons they can be used as an alternative to battery backup for memory.

You don't think so? You'd be surprised. 'Where a large number of charge/discharge cycles are required, the Gold Capacitors will operate reliably for over 20,000 cycles — compared with a thousand cycles for a nickel-cadmium battery.'

And you can get blocks of them of storing 5.5 volts up to 3.3 farads, which will keep a lot of memory going for quite a while.

Details on (0753) 73181.

walking through the changing rooms of a sauna/swimming pool, and noticing a shapely pair of legs under one of the shower doors. As he opens the door, the action freezes, and the computer makes random jumps — either to an angry young man, or to an embarrassed young lady — after everyone has placed their bets.

My favourite, by far, was the one showing three of those weird aliens from the Star Wars bar, all drinking in a Tokyo hotel. One gets up to visit the toilet, and stops between the two doors.

Which door will it go through — the Gents? Or the Ladies? Place your bets!

Quick off the mark

Commodore has announced approved status for a Plus/4 business program — Company Pac 1*2*3 — saying that it's the first business product to get this approval.

Actually, it's the first product I've ever heard of for the Plus/4 at all.

Despite the name, it's not an imitation of Lotus Development's product for

the IBM; it includes various ledger packages and management reporting routines, all on one disk.

Normally the thing costs £98.95, but the first 50 applicants were to receive a discount down to £50 by phoning (01) 900 0999. I wouldn't get too worked up about that — the release was sent to us in December, and just possibly someone else has already phoned.

Unix wasting time

If IBM continues to back MS-DOS as its primary operating system, and if that operating system is enhanced to gradually include a sophisticated degree of multi-tasking, 'then that'll be the end of Unix, at least as far as the PC world is concerned,' commented a pundit in Los Angeles recently.

The pundit is my old friend David Ferris, head of Ferrin, a company which trains corporate users of micros, and advises on selection of hardware and software. And I couldn't have put it better myself.

Ferris and his colleagues do

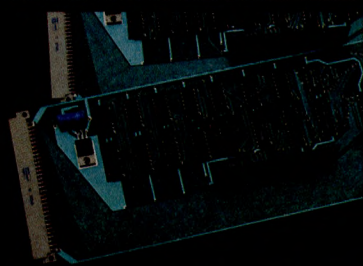
With Quest the QL really means business



Executive Series



QL Expansion Console



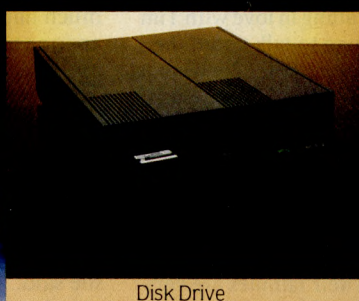
Memory Expansion Board



Business Accounts Software



CP/M 68K



Disk Drive

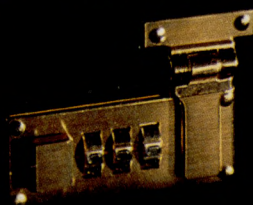
Quest's Executive series of quality peripherals and software for the Sinclair QL allows the business and serious home user to fully realise the full potential of the most exciting computer of the 80's.

Post the coupon below to obtain details of a wide range of Quest Executive products including:

- CP/M 68K
- Business Accounting Software
- Floppy and Winchester Disk Drives
- Memory Expansion Boards
- Monitors
- Printers
- Consumables

Telephone Sales Desk 04215 66488

CP/M is a registered trademark of Digital Research.
QL is a registered trademark of Sinclair Research.



Quest International Computers,
School Lane,
Chandlers Ford, Hants. SO5 3YY
Telex 47326.

Please send me details of the Quest Executive Series

Name _____ Tel. No. _____

Address _____ My QL Serial Number
is _____

Position _____



Another leap forward
QUEST

The reasons single people join Dateline are often very varied, but come down to one thing — they are simply not meeting the sort of people they would like to meet.

Tim Stagg, a 31-year old engineer from Pangbourne, found that the break-up of his marriage two years previously and the ending of another relationship since, had left his confidence rather dented. 'So I thought I'd try Dateline because at least that gives you a starting point for meeting people.'

At first Tim could not bring himself to actually telephone any of the girls whose names he received through Dateline; instead he made the initial approach by letter. He was delighted when girls started to telephone him, after receiving his name on their lists. For Tim it made the whole thing a lot easier, and a series of pleasant dates soon saw the return of his confidence. Fortunately, because on his third list from Dateline appeared the name of Christine Terry.

'Many of my colleagues were married'

Tim and Chris agreed to meet at a point halfway between his home and Basingstoke, where Chris worked as a student midwife. Having just moved to Basingstoke, and working unsocial hours, Chris found it very difficult to meet people. 'Many of my colleagues were married and I was getting very low,' said Chris, an articulate 29-year old. 'I saw Dateline advertised and decided to give it a try.'

Chris had only been a member of Dateline for two weeks when Tim contacted her. Nevertheless, she managed to meet four people before that! But she was immediately taken with Tim when he phoned and was delighted when he suggested that they meet.

They agreed to meet in the car park of a pub and swapped car registration numbers as a means of identifying each other. Chris liked Tim immediately. 'Even seeing him sitting in his car, I thought 'We're going to get on!' Mind you, I thought that when he phoned up first of all. He was quite cheeky on the phone and I liked that.'

'Time just flew by...'

Tim was also very taken with Chris and their first evening was extremely successful. 'The time just flew by. It seemed we had only just met and then it was time to go again. I can't even remember what we talked about!'

They decided to meet again a week later ('or sooner if you prefer,' Tim had said, hopefully), and Chris went home to her parents for the weekend. She returned to Basingstoke rather earlier than anticipated on the Sunday and felt like seeing Tim again, so she phoned him and they met again at 'their' pub that evening. They've met nearly every night since!

Within two or three weeks, Chris



'We are going to get on!'

realised that she was falling in love with Tim and they were beginning to talk about the possibility of a future together. 'We went to London for a few days,' remembered Chris, 'and Tim said, 'Why don't we go to Hatton Garden and get a ring?!' So we did! It was a lovely day.'

Within three months of meeting each other, Chris and Tim were engaged and are planning a wedding in a year's time when Chris has qualified. Their families are very happy for them and Tim has found his friends very supportive. 'I thought they would laugh at me joining Dateline, but they didn't,' he said. 'After a while, especially after I met Chris, it made such a tremendous difference to me — I was so

much happier. I would definitely advise anyone to join Dateline. I enjoyed nearly all my dates and even at worst had a pleasant evening out each time. Dateline helped me get my confidence back and I enjoyed my membership.'

Even though Chris was a member for such a short time she met quite a few people before finding Tim. 'Even just getting correspondence and phone calls was nice,' she said. And what advice would she give people who join Dateline?

'Give it time and you do meet the right people,' she said, smiling at Tim.

If you would like to be one of the many thousands of people nationwide who have been making friends and enjoying a new social life through Dateline, complete this simple questionnaire. We will send you confidentially and completely free, full details about Dateline and how it works, and details of just one of the Dateline members who are compatible with you. Send to: Dateline Computer Dating, 23 Abingdon Rd., London W8. Tel: 01-938-1011

CONFIDENTIAL

FREE: Computer Test to Find Your Ideal Partner.

1 START HERE ▶

Do you consider yourself:

☐ Shy ☐ Extrovert ☐ Adventurous ☐ Family type ☐ Clothes-conscious	☐ Generous ☐ Outdoor type ☐ Creative ☐ Practical ☐ Intellectual
--	--

2 Indicate which activities and interests you enjoy by placing a '1' (one) in the appropriate box. If you dislike a particular activity, write a '0' (nought) in the box. If you have no preference, leave the column blank.

☐ Pop music ☐ Fashion ☐ Pubs ☐ Sport ☐ Pets ☐ Folk music ☐ Jazz ☐ Travelling ☐ Cinema ☐ Good food	☐ Politics ☐ Classical music ☐ Art/Literature ☐ 'Live' theatre ☐ Science or technology ☐ Creative writing/painting ☐ Poetry ☐ Philosophy/Psychology/Sociology ☐ History/Archaeology ☐ Conversation
--	---

☐ I am over seventeen and would like you to send me completely free and without obligation, a description of my ideal partner. Plus a free full colour brochure and lots more information about Dateline. I enclose two first class stamps.

3 Your sex ☐ M ☐ F **Your Height** ft. ins
Your Age yrs. **Age you would like to meet** Min. Max.
Christian Name
Surname
Address

Nationality **Religion**
Occupation PCW 3

Send today to:
Dateline, Dept PCC
23/25 Abingdon Rd.
London W8.
01-938 1011

Dateline

WHAT THE EYE CAN'T SEE....



....QUALITY... THAT'S Eurodisk



CPS Data Systems Ltd.

ARDEN HOUSE,
1102 WARWICK ROAD, ACOCKS GREEN,
BIRMINGHAM B27 6BH ENGLAND
TELEPHONE: 021-707 3866 TELEX: 337141 CP5DSE G

10 HIGH QUALITY DISKS IN A
PERMANENT LIBRARY CASE.
AVAILABLE IN ALL FORMATS.

believe that there is a major requirement for 'a good, standard, multi-tasking operating system for personal computers,' but they don't think Unix is the one.

To cap it all, the firm is unimpressed by the Unix ability to put several users on one PC ('just a waste of time,'

it said) and is warning corporate clients to steer clear of Unix for software reasons, too. 'The software for business use just isn't good enough,' said Ferris.

Educational link

It is unfortunately true that

many schools have both the recommended educational micros — the Research Machines models, and the Acorn model — and that they are about as friendly as chalk and cheese.

A network which lets them link up has been developed by Richmead Micro of Reading, and it sounds like a sensible use of resources as opposed to an ideal solution, which might involve buying new resources.

'Before the Beeb,' commented the company in its announcement, 'most secondary schools used the RML 380Z. But when the BBC Micro was launched, many switched over because the relative low cost allowed them to use several computers in a classroom where before they could afford only one.'

Most schools handed the disk-based 380Z over to the administration side. Then they found that a network of BBC Micros was possible, but they needed a big disk as a file server.

Richmead's solution: connect up to 16 BBC Micros together in Meadnet, and forget about Econet.

It costs £275 plus £20 for each BBC station, and is slower than having individual disks 'but faster than tapes,' according to teachers at one school where it is used.

Details of Richmead on (0734) 665771

Rich pickings

Immediately after finishing this issue of Newsprint, I went to Apple's head office to be told about its new local area network.

Apple is making quite a fuss about this deal — air tickets to California will cost them a bit — and the reason is simple: there is immense scepticism about it in the networking business.

Two areas worry the experts. Firstly, they say, the network is far too slow.

Harry Saal, network pioneer at Nestar, summed it up: 'It's the same speed as a thing we had working four years ago on Apple II systems, and it just isn't satisfactory. We'll leave this network to our rivals, 30Cm, and make do with the pickings from the IBM business.'

The speed is around 300 kilobits per second, where even the slower rivals start at four to ten times that data rate — and some run a great deal faster still.

Speed, however, isn't what worries my pundit friend David Ferris. He's taken the trouble to issue a condemnation of the apparent cost of the system — which Apple says will be £50 per micro.

'We have found that when you add up all the hidden expenses of building a network, the costs of the wires are trivial,' Ferris told me. 'We've installed more networks in the San Francisco area than anybody else, I'd say in the world, and really, the costs can be as high as fifty times greater than the cost of the micros, and the wires, and the software all together.'

However, it isn't all bad news: Ferris as a company has suffered long enough from the software problem — no software works on most networks — to give high praise to Apple's approach to this.

Tactlessly issuing his release a week ahead of Apple's, Ferris commented: 'We give high marks in most areas, especially the announcements about collaboration with software vendors. It will take a long time before most people are able to use Apple Net, but by 1986, we think it will be a serious standard.'

I was particularly amused by the number of news media who took the meat of Ferris's announcement, and reported the Apple network launch without Ferris's comments as if they'd dug it all out of the grapevine themselves...

Going down

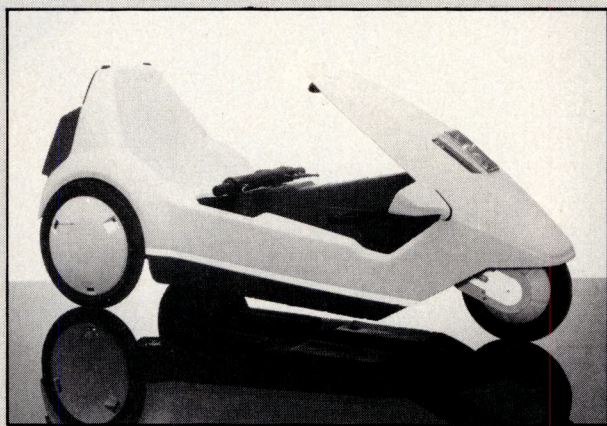
The Spectrum has been dropped in the UK but the Spectrum Plus lives on, with its price cut to £129.95 from £179.95 (although you now have to pay for the software pack which used to be bundled in).

And you can upgrade your old Spectrum to Plus level for £30. Or indeed, thanks to Acorn, you can take it (or any other micro) to a BBC dealer and get £50 off the price of a Beeb.

Acorn also got in on the post-Christmas price-cutting with the Electron coming down £70 to £129.

END

Guy Kewney can be contacted on electronic mail. His numbers are Source TCK106, and Telecom Gold 81:JDS018.



Sir Clive Sinclair's C5 electric vehicle costs £399 and is delivered to your door in a cardboard box.

It is 5ft 9in long, 2ft 5in wide and only 2ft 7in high. The C5's body consists of two white polypropylene mouldings which are electrically melted together, forming a rust-proof shell for the Lotus-designed steel chassis.

The C5 is driven by a washing machine-derived motor, which is made by the Italian firm Polymotor which also makes motors for gyros and torpedoes. The motor drives only one of the three glass-reinforced nylon wheels, and through it the C5 can achieve a speed of 15mph. The motor is powered by a heavy-duty, deep discharge, lead acetate battery which gives the C5 a range of about 20 miles. The motor is activated by holding down a button on the control bar and cuts out as soon as the button is released. Should you run out of power then the C5's pedals will get you home. Once there, an overnight charge will restore the battery.

The driver sits in the seat and assumes a go-cart style posture, with his feet on the pedals and his hands resting on the control bar which runs under his legs.

At either end of the control bar are bike-style controls that activate the progressive brakes, which give a stopping distance of 20 feet at 15mph. Other controls, situated under the seat, turn on the front and rear lights, and the ignition key.

A Ferranti-designed ULA drives two LED displays. One tells the driver the amount of power that's left in the battery, and the other indicates how hard the motor is working.

The C5 is initially only available by mail order from Sinclair Vehicles, which is a separate company financed by the sale of 10 per cent of Sinclair Research.

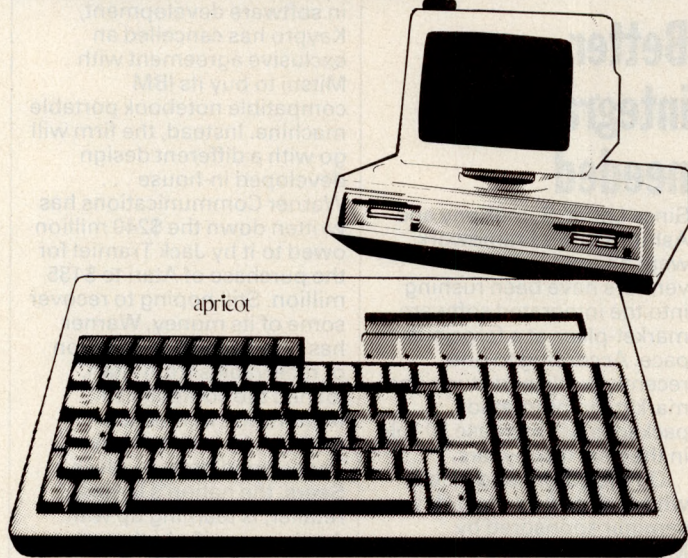
The vehicle can be driven by anyone who's 14 or over — without a licence, helmet or road tax. Nor do you need any insurance, although the Prudential will insure you for between £20 and £50 (depending on your age).

Sinclair Vehicles also plans a range of add-ons, including booster pads so that smaller drivers can reach the pedals, wing mirrors and indicators, a horn, a 'high-vis' mast so that other road users can see you, and designer-styled waterproofs to keep you dry.

Sinclair watchers will notice a slight change in the order form. Under the usual '28 days for delivery' is a paragraph explaining that the company won't cash your cheques until delivery.

Although the C5 is only available by mail order, you can see one before you buy — it's displayed in 100 electricity showrooms throughout the country.

Have you looked into renting a micro-computer?



Perhaps you should. If you have a work overflow. A special project. An out-of-service machine. A training course or software demonstration to give. A show or conference. Or a budget to prepare.

The benefits are many. Capital and lines of credit are kept free. You pay for use, not ownership. Payments are predictable and deductible. Cash flow is smoother.

If you don't like your choice, you can try again. If you do, you can apply part of the rental cost to a purchase.

CCA specialise in renting micros. And in giving you the most for your money. To find out more, attach your business card to this advertisement and post it. Or phone if you wish.

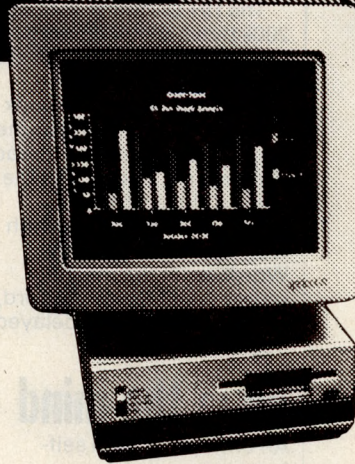
CCA MICRO RENTALS

CCA MICRO RENTALS LIMITED

Unit 7/8, Imperial Studios,
Imperial Road, London SW6 2AG.
Telephone: 01-731 4310

PCW

FREE



**PEACHTREE
ACCOUNTING
OR OFFICE
SOFTWARE**

**WHEN YOU
ORDER...**

**SELECTED
HARDWARE**



**WHILE
STOCKS
LAST**

**CONTACT
CISS NOW FOR DETAILS
PHONE 01-446 6841**

CISS, 311 Ballards Lane,
London N12 8LY.



ATTENTION!!

DOES YOUR COMPANY

- ! WRITE SOFTWARE FOR SANYO COMPUTERS
- ! RETAIL SOFTWARE FOR SANYO COMPUTERS
- ! RETAIL SANYO COMPUTERS

IF SO SEND DETAILS NOW TO

S.M.U.A.

**2/6 QUADRANT ARCADE
80 REGENT STREET,
LONDON W1R 5PL**

PCW107



Our US reporter David Ahl has interesting news of a new operating system, HH-DOS, and subliminal software.

Portable operating system

Microsoft has developed a new operating system, HH-DOS (Hand-Held DOS), for notebook portable computers; it incorporates features of MS-DOS and various integrated software packages.

System calls and the file structure of HH-DOS are the same as MS-DOS, although by no means is it fully IBM PC compatible. Thus, data files and Basic programs can be up and downloaded from HH-DOS, but applications programs will undoubtedly require modification to run.

HH-DOS also integrates several applications software modules including the Microsoft Word word processor, Multiplan spreadsheet, Telecom (similar to the Tandy Model 100 version), File (a file manager), the Basic language, a calculator, calendar/scheduler, and modem dialer. These last three programs may be run from a window without disturbing the primary application in the machine.

The integration of software exists on both a file and functional level; you could pull all or a portion of a spreadsheet into the word processor. A File file can be moved into the spreadsheet, or a Basic program can be edited from either Basic or the full-screen word processor editor.

Data interchange between programs uses the Microsoft Word 'scrap' concept: that is, mark a word (or block), throw it into scrap, go to the other application and recover the scrap. If it's a big or important scrap, you can name it and automatically make it into a file.

The HH-DOS software of 200k bytes is etched onto two CMOS ROM chips which are currently being sold to manufacturers of notebook portables. An early customer was Zenith which has already shown a nifty new machine behind closed doors. However, I hear that Zenith would prefer to include WordStar in the machine rather than Microsoft Word, and, as a result, has delayed its introduction.

All in the mind

An entrepreneur in self-hypnosis and self-improvement audio tapes is now offering a computer program that seeks to tap the subconscious mind. 'We're changing the internal tapes inside your head,' proclaims Joel Amkraut of the California-based New Life Institute.

The program flashes messages for a fraction of a second on the computer screen while the user works on primary computer tasks. Over an eight hour day, a user would receive as many as 28,000 subtle copies of the message. He can put in his own message — to lose weight, stop smoking, avoid alcohol, overcome phobias, gain self-confidence, lessen stress, or address a variety of other ills.

Currently there is a great deal of debate as to whether such systems really work. Several university professors voice scepticism and feel that it's difficult to rapidly undo something that nature instilled in a slow and painful way.

Nevertheless, several companies have sprung up to market subliminal software. In addition to New Life, these include Greentree Publishers, Cabononics, and Futique, Inc. The latter firm was founded by Timothy Leary, the counterculture hero who championed psychedelic drugs in the 1960's.

Developers of these programs acknowledge the possibility for abuse. For example, an employer could use the program to instill company loyalty and fanaticism, or to send seductive suggestions to an unknowing typist to further sexual ambitions. One developer boasts of using his program to attract people to

Christianity — which may or may not be the Christian thing to do.

Better integration needed

Since Lotus' Symphony and Ashton-Tate's Framework were announced, other vendors have been rushing into the integrated software market-place at a ferocious pace. According to one recently published study, the market for integrated packages will increase 20-fold in the next three years.

On the other hand, users who took part in a two-day seminar sponsored by MicroMentor, Inc, a computer training firm, registered dissatisfaction with existing integrated packages and eagerly await a new generation of stand-alone applications packages. Users felt that most integrated packages offer one strong application augmented by several weaker ones. Symphony was praised for its excellent spreadsheet, but users felt the word processor was lacking. In contrast, the word processor in Framework is very good, but the spreadsheet is weak.

Users also felt that software developers should create common user interfaces and file formats that would allow the use of stand-alone packages from different companies.

In addition, users criticised existing channels of distribution in which sales people push well-known 'safe' brands of software rather than investigating new products that may be superior. Users felt that they would be better served if they had more direct contact with software publishers, and expressed dissatisfaction with software packages that mainly reflect fancy technology rather than responding to users' needs.

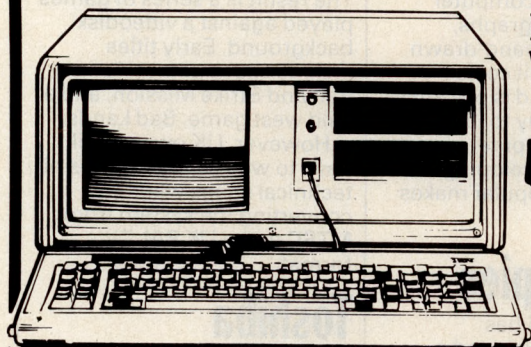
Random bits

After failing to line up distribution with any major retail chains for its Decision Mate V or later IBM PC compatible computer, NCR is closing its US PC manu-

facturing factory and transferring production back to Germany . . . Citing delays in software development, Kaypro has cancelled an exclusive agreement with Mitsui to buy its IBM compatible notebook portable machine. Instead, the firm will go with a different design developed in-house . . . Warner Communications has written down the \$240 million owed to it by Jack Tramiel for the purchase of Atari to \$135 million. Still hoping to recover some of its money, Warner has purchased \$10.1 million of receivables from Atari, loaned the company \$8 million, and agreed to a further \$4.5 million loan. That's good news for Jack . . . Sears, the nation's largest retailer, is teaming up with Apple to see if a high-end computer will sell in a department store. For the test, the Apple IIc will be sold at \$984.99 side by side with the Commodore 64 and Atari 800XL, both priced at less than \$200 . . . Hallmark, the greeting card and stationery giant, has acquired Information Technology Design Associates, a firm involved in designing software for children. ITDA's most successful product is Microzine, marketed by Scholastic . . . Faced with disappointing sales of its Professional Computer, Texas Instruments is shifting its retail focus to vertical markets such as engineers, architects and doctors. The company plans to train dealers in selling to these markets and to provide sales leads . . . Hewlett-Packard is expected to release a 32-bit transportable computer with the Unix operating system. The machine will be aimed at the technical and scientific community, and, at \$5000, will be one of the least expensive Unix machines on the market . . . ICL's OPD has some company: over 20 firms are selling new machines that combine the functions of a computer and telephone at prices from \$1000 to \$6000. Analysts, investors and manufacturers predict the machines will become absolutely essential to anyone in business. One problem: they aren't selling. Of the machines, one consultant said: 'You might as well put a coffee pot on your personal computer.'

END

KGB THE PRICEBREAKERS!



IBM PC AND XT

Various options available. Call for details.

NEW

IBM PORTABLE

256K RAM. 2 x 360K Floppies.
Integral Screen. Keyboard. DOS 2.1.

£2195.00
ex VAT

**CALL ABOUT OUR AMAZING
AUTUMN OFFERS!**

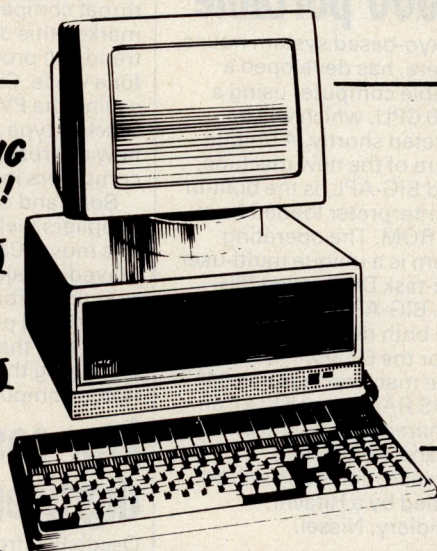
OLIVETTI

Very fast. Fully IBM compatible.

M24 True 16 Bit Processor. 128K RAM.
2 x 360K Floppies. Screen.
Keyboard. DOS 2.1

£1595.00
ex VAT

10MB Version **£3200.00**
ex VAT



**CALL ABOUT OUR AMAZING
AUTUMN OFFERS!**

£1795.00
ex VAT

APRICOT Standard

Full 16 Bit 8086 based Micro
with 256K RAM. Mono Screen.
2 x 315K Floppies. MS DOS.
Basic, Supercalc, Superplanner,
Superwriter.

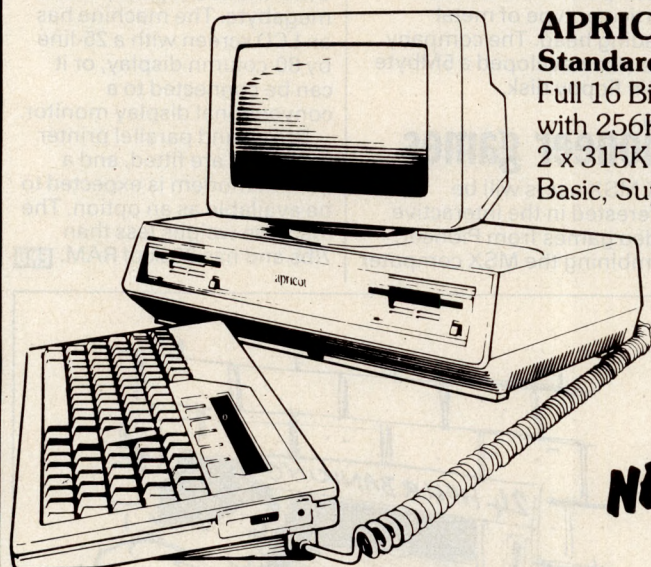
Xi

as standard Apricot but with 5MB
Winchester in place of one Floppy Drive

£2695.00
ex VAT

NEW Portable from **£1695.00**
ex VAT

F1 Series from **£795.00**
ex VAT



**Free Software Seminars held on Second and Fourth Thursdays of every month.
Ring Susan for details on Windsor 50111**

KGB
MICROS LIMITED

106 St Leonards Road, Windsor,
Berkshire, SL4 3DD
Tel: Windsor (07535) 50111 Telex: 848521



Authorised dealer for

olivetti

Specialists in Computer Aided Design

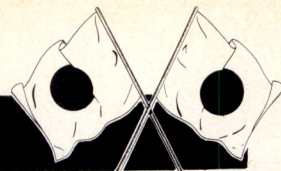


FREE SOFTWARE SEMINARS

PCW/3/85

To: KGB Micros Ltd., 106 St Leonards Road, Windsor, Berkshire SL4 3DD.
Please send me full details on the Free Software Seminars.

Name _____
Position _____
Address _____
Tel: _____



Briefcase portables and a new computer price war dominate the Japanese scene — Shinichiro Kakizawa reports.

68000 portable

A Tokyo-based system house, Ampere, has developed a portable computer using a 68000 CPU, which will be marketed shortly. A unique feature of the new machine, called BIG-APL, is the built-in APL interpreter loaded from 128k ROM. The operating system is a unique multi-user, multi-task DOS called BIG-DOS. BIG-APL and BIG-DOS were both developed in the US for the 68000.

The machine features 54k CMOS RAM (max 512 k), an 80-character x 16-line bit map, LCD and weighs 4kg. Overseas marketing will be handled by a Hitachi subsidiary, Nissei.

Full-screen portable

Fujitsu has announced a 16-bit briefcase computer which weighs 2.7kg. Like the KT portable, it has a full 80-character x25-line LCD screen, and features an Intel 8086 CPU, and 464k RAM; it runs on Digital Research CP/M-86. The highlight of the machine is its graphic capability — the LCD screen can display 640 x 200 dots. Fujitsu hopes to set the price at around £1000, and the printer will come separately.

Price wars

The price war at the lower end of the home computer market is hotting up in Japan. This means low-cost MSX computers and micros for the home and games users.

This new price war was triggered by Casio, which began selling its MSX machine model PV-7 last October. The recommended list price is Yen 29800 (approximately £99), but in the space of a month the price has gone down to only £50 at some discount shops around the famous Akihabara

electronics bazaar in Tokyo. Other prices have been forced to follow suit. Now the cheapest family computer in the Japanese market is the Nintendo colour game model which costs only £16 (the original list price was £70, only a few months ago).

Because of the recent cut-throat competition in the market, this downward price trend will probably continue for a while. Casio is also selling the PV-7 through Sinclair-type mail order, a new approach to selling computers in Japan.

Sony and other MSX suppliers feel threatened by this move. Casio has always played a major role in bringing affordable goods to the general public, and it looks as if the company is extending this virtue into the home computer market.

Low-cost digitiser

Oscon Electronics, a Tokyo-based company specialising in digitiser units, has made an extremely cheap digitiser available to MSX users. The new unit, Oscon MSX GP AD, is an electromagnetic induction digitiser. It costs £110, a quarter of the price of the many existing digitisers in the Japanese market. Until now digitisers, although extremely useful, have been highly priced compared with the mouse. One of the advantages of using an electromagnetic board is that you can rest your hand on the board without getting ?QZ!#£A on the screen!

The Oscon model can be switched into two other modes, pad mode and joystick mode.

Cheap graphics

A built-in image scanning unit for the Sharp PC5000 portable computer has been developed by Japan Softhouse, a Tokyo software company. The scanner head snaps easily onto the printer ribbon cassette of the Sharp PC4000 printer. Graphic images drawn on paper are fed into the printer, and the scanned, digitised data is transferred to the micro through its RS232C interface.

The unit can transfer any image onto the computer including photographs, characters and hand-drawn pictures. The unit costs around £300, and is probably the cheapest way to input images to a computer. Japan Softhouse is developing the unit for other popular makes of printer.

New floppies

Hitachi-Maxwell has successfully developed a 5¼in floppy disk which can store as much as 19Mbytes. 1.0 to 1.6Mbytes is the standard for most micros at present, and the expensive hard disk has been the only way to store up to 10Mbytes.

Now this limit seems to have been removed. Hitachi-Maxwell coats the surface of the disk with a special combination of magnetised metal powder, and uses a particular type of metal reading head. The company has also developed a 5Mbyte 3.5in floppy disk.

Pioneer games

UK MSX users will be interested in the interactive video games from Pioneer, combining the MSX computer

with the Laserdisk system. The result is a series of games played against a videodisk background. Early titles include space games Astron Belt and Strike Mission, and a wild west game, Bad Lands.

However, UK owners will have to wait as Pioneer has hit technical snags when converting the system from MTSC to the UK PAL TV format.

Toshiba American-style

Toshiba has prepared a Japanese response to American portable machines such as the Data General One and Texas Instruments' Pro-Lite.

Said to be fully compatible with IBM's PC, the T1100 is a briefcase-sized machine with a built-in 3½in disk drive. Unformatted capacity is one megabyte. The machine has an LCD screen with a 25-line by 80-column display, or it can be connected to a conventional display monitor.

RS232 and parallel printer interfaces are fitted, and a built-in modem is expected to be available as an option. The machine weighs less than 7lbs and has 256k of RAM. **END**



"I'M A TOSHIBA HX10.
I'VE GOT ALL THE
BEST BITS FROM EVERY
OTHER HOME COMPUTER.
AND MORE. I HAVE A
64K MEMORY, LIKE THE
COMMODORE 64. A
CASSETTE INTERFACE,
LIKE THE BBC. TWO
JOYSTICK PORTS, LIKE
THE COMMODORE 64.
A BUILT IN POWER
SUPPLY, LIKE THE
BBC. 16 USABLE
COLOURS, LIKE THE
ACORN ELECTRON. OVER
70 FULL STROKE KEYS,
LIKE THE BBC. A
CARTRIDGE SLOT, LIKE
THE COMMODORE 64.
A PRINTER INTERFACE,
LIKE THE ORIC ATMOS.
SOUND OUTPUT THROUGH
THE T.V., LIKE THE
COMMODORE 64. AN
AUDIO/VIDEO OUTPUT
CONNECTION, LIKE
THE COMMODORE 64.
RF BUILT IN LIKE
THE BBC. AND: A
SEPARATE 16K VIDEO
MEMORY, UNLIKE MOST
NON-MSX COMPUTERS.
32 SPRITES, MORE
THAN MOST NON-MSX
COMPUTERS. AND I USE
MICROSOFT EXTENDED
BASIC, LIKE EVERY
OTHER MSX COMPUTER."

"WOW. WITH A
SPECIFICATION LIST
LIKE THAT.
NO WONDER YOU'VE
GOT A 64K MEMORY."

You'd expect one of the best-selling home computers in Japan to have a specification list as big as its memory.

But the Toshiba HX10 doesn't just limit itself to that.

It was developed along with other Japanese home computers to operate

on one language: MSX. You can swap programs, games, cassettes, even peripherals like disk drives, printers, and joysticks: they're all compatible with every other MSX computer.

All of which makes MSX the system of the future.

So if you want a computer that won't be obsolete in a few years, buy an MSX. If you want one of the best-selling MSX computers in Japan, buy a Toshiba HX10.

TOSHIBA **MSX**

FOR MORE INFORMATION ON THE TOSHIBA HX10 CONTACT TOSHIBA (UK) LTD., TOSHIBA HOUSE, FRIMLEY ROAD, FRIMLEY, SURREY GU16 5JJ. TEL: (0276) 681691.

Have you got the drive to succeed in business?



£199

DD1-1 disc drive (with CP/M* and DR. LOGO*)
and interface.

£159

FD-1 additional disc drive.

Running any business successfully means first running it efficiently.

And no matter how business-like you think you are, you can't beat the power and convenience of a random access CP/M* disc system.

Now, with Amstrad's CPC 464 computer, you can enjoy all the advantages of a 3" disc drive complete with an integral power supply and plug-in interface controller.

Naturally, you can add a second drive (FD-1) to double the on-line storage capacity, speed up copying files and producing back-up discs.

But of course, simply plugging a disc drive into a computer won't get you very far.

That's why Amsoft have produced a disc based software range of over 30 programs with many more on the way.

AMSDOS and CP/M*

CP/M* is the standard disc operating system for 8-bit microcomputers.

We also supply a special version of DR. LOGO* for CPC 464 users.

Our disc drive system includes a number of extensions to BASIC in the AMSDOS operating system that allow the disc to use files originally created for cassette, and vice versa.

Software also takes care of the necessary file management so that CP/M* files can exist alongside these AMSDOS files.

Data files may even be shared between AMSDOS and CP/M*.

Word processing, data management, accounting, ledgers – you'll

£239

complete with green screen VDU (GT64) and FREE software pack worth over £100.

£349

complete with colour monitor (CTM640) and FREE software pack worth over £100.

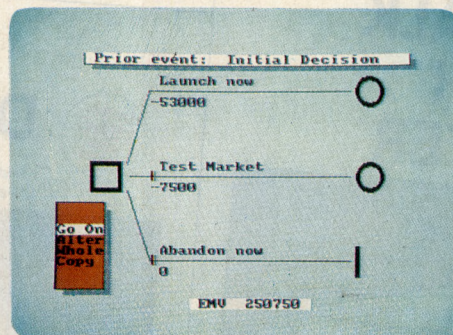


CPC 464
complete
with
monitor
and
datacorder

find an AMSOFT program to suit whatever kind of business you want to do on your CPC 464.

There's even a range of programs that teach you professional business practice.

Incidentally, you can exchange your Amsoft cassettes for identical Amsoft disc software for a mere £4.95 per cassette (the cost of a blank disc).



Decision Maker

CPC 464.

Really gets down to business.

At the heart of it all, of course, is the incredible Amstrad CPC 464 computer.

The CPC 464 has a typewriter-style keyboard, large ENTRY key, sensibly positioned cursor keys, numeric keypad for fast data entry and a full 8-bit character set.

It provides high resolution graphics, 80 column text display, up to 8 text windows plus a graphics window and a palette of 27 colours.

There's also a built-in Centronics standard 7-bit parallel printer interface. So you can enjoy high performance word processing with the printer of your choice.

The CPC 464.

It does whatever you want it to do. But that, of course, is your business.



Optional 80 column dot matrix printer DMP-1. Operates at up to 50 characters per second.

AMSTRAD

ONE GREAT IDEA AFTER ANOTHER

BOOTS COMET Currys Dixons
Greens John Menzies RUMBELOWS spectrum
WHSMITH WIGFALLS AND OTHER COMPUTER STORES

*CP/M and DR. LOGO are Trade Marks of Digital Research

I'd like to know more about the businesslike CPC 464 complete computer system. Please send me literature right away.

NAME

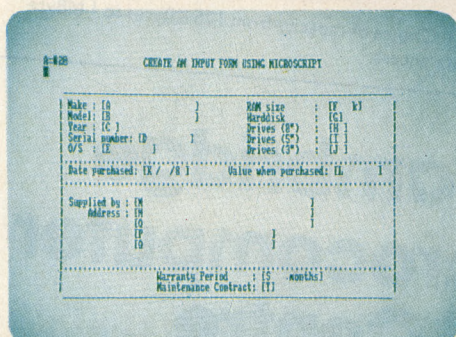
ADDRESS

POSTCODE

To: Amstrad Consumer Electronics PLC, Brentwood House, 169 King's Road, Brentwood, Essex CM14 4EF.

PRICES CORRECT AT TIME OF GOING TO PRESS. NOT ALL STORES STOCK ALL PRODUCTS.

PCW7



Microscript

Get the full story

DOT MATRIX PRINTER SC-1000

COPAL

GUARANTEE:
If any machine is found
to be defective (other than
through normal wear and
tear) within six months of
purchase, we will replace
it free of charge
within 48
hours.

£218



100 CPS • Centronics and Serial Interface • Tractor and Friction Feed.

DOT MATRIX PRINTER SC-1200

COPAL

GUARANTEE:
If any machine is found
to be defective (other than
through normal wear and
tear) within six months of
purchase, we will replace
it free of charge
within 48
hours.

£248

NLQ
£285



120 CPS • Near Letter Quality option available • Centronics Parallel Serial Interface (option).

TYPE & TALK SPEECH COMPUTER

DEALER & OEM
ENQUIRIES
WELCOME

£171



Instant conversion of typed ASCII text into speech • Unlimited vocabulary • Centronics and Serial RS232 or 423 Interfaces.

NAMAL DISK DRIVES

USING
TEAC
FDSS
SERIES

- 1 Single Disk Drive
- 2 Single Disk Drive with PSU
- 3 Dual Disk Drives (vertical)
- 4 Dual Disk Drives (horizontal)

from
£120



TEAC 5 1/4" Drive • Choice of capacity from 125 KBytes to 1 MByte • High-speed data access.

from CMC

The new range of peripherals from CMC represents outstanding quality at the best prices around. Full details and colour leaflets on each product are available on request—call us on Cambridge 355404.

ALL PRICES INCLUDE VAT

Cambridge Microcomputer Centre

153-54 East Road, Cambridge CB1 1DD
Telephone (0223) 355404 Telex 817445

LETTERS



Benchmarks

As a regular reader of *PCW* I have been waiting to see a Benchtest of the business world's true pace-setter — the Wang PC. After your review of the IBM AT I ran the Benchmarks on the Wang PC, and with crude timing methods obtained the following results:

BM 1	0.8	BM 5	5.0
BM 2	1.9	BM 6	9.0
BM 3	4.0	BM 7	13.0
BM 4	4.0	BM 8	15.0
Average 6.59			

This performance would put the Wang into second place in your Benchtest roundup without the help of a maths co-processor or compiled Basic! As these two options are available, the Sage II may prove a pretender to the throne.

K W Beales, Kings Langley, Herts.

Ancient bugs

Bugs are older than you think. The *O.E.D. Supplement* quotes: 'Mr. Edison, I was informed, had been up the two previous nights discovering a bug in his phonograph — an expression for solving a difficulty, and implying that some imaginary insect has secreted itself inside and is causing all the trouble', from the *Pall Mall Gazette*, 1889.

Dr F Marriott, Enstone, Oxon

Micro musts

Not all the features needed in the real world of personal computer systems' users are among those you see on the usual micro charts. There are still some things I miss. For example:

A minimal start-up time — when I started with my WP program, it was taking three minutes to load from cassette. With a succession of upgrades I finally cut that down to seven seconds;

Minimal desk imprint — this includes the possibility of

moving the keyboard off the desk space altogether when not in use, and there's no spaghetti junction of wires;

Maximum user-friendliness — this begins with the keyboard and the screen. It includes a placing of the cursor keys to suit touch-typing, unless cursor movement can be catered for better with voiced commands. Some fancy systems, with cursor keys placed on a far corner of the keyboard, are hopeless in this respect;

Internal power back-up — this goes with portability, or at least with not being wholly dependent on mains power in one place. Apricot-style segmentation, if only combined with battery power, might be the best solution;

Printer quality with versatility — what is needed is a better way than I have yet seen of combining letter-quality mode with draft speed and print variety. Perhaps we need a combination of 24-wire head printers with personal typesetter programs;

Program access to printer capacity — programs (I am thinking especially of word processing programs) should be able to access anything any printer can do: for example, if print commands in ASCII code are provided for. Ideally it should be effective both for screen display and for printout, so that you can see what you'll get.

Parig Digan, Navan, Ireland

Not quite right

I have been reading your journal for quite some time and generally find it quite factual. One exception, however, is David Ahl's comments in the December 1984 issue. Under the heading, 'Eat your words' he states: 'In 1950, a study by Univac indicated that five computers would meet the total worldwide demand for the foreseeable future.'

In 1949, one year before his 'study', there were actually six Univac's already on order, three for the government and three for industry, with additional contracts being actively pursued. When

Remington-Rand purchased the Eckert-Mauchly Computer Corporation in February 1950, the production plan called for an initial run of 10 or 20 systems. At no time did anyone ever think that the total demand was as ridiculously low as five. The only problem was one of deciding how much of a production commitment to make in advance of firm orders.

It is true that some studies were later carried out, but none of them ever indicated a number as low as that quoted by Mr. Ahl.

James Weiner, Brussels, Belgium

Spectrum compiler

I was interested in the article on the Acornsoft ISO Pascal compiler in your December 1984 issue, and in particular, the Benchmark programs. I thought Z80-based machine owners might be interested in the following timings for the Hisoft Pascal compiler, running on a ZX Spectrum (all times are in seconds):

Magnifier	0.9
For loop	6.9
While loop	7.9
Repeat loop	7.7
Literal assign	7.4
Memory access	7.7
Real arithmetic	20.7
Real algebra	21.2
Vector	16.8
Equalif	10.7
Unequal if	10.5
No parameters	6.3
Value	7.0
Reference	7.0
Maths	88.6

I think the timings speak for themselves, and show the significant difference between true and p-Code compilers. Indeed, it is quite educational to be able to disassemble the output code and compare it with the source.

The compiler circumvents the problem of lack of memory very well — allowing compilation of source direct from cassette or microdrive, and permitting programs generating up to about 21k of compiled code to be run.

The editor is line based, and very easy to get used to. Source entry is easy (the Spectrum keyboard is used as

a normal typewriter but without all the keywords.) The only component lacking at present is the ability to handle files, although hopefully this will come soon (not an unreasonable hope, as the Hisoft C compiler handles files on cassette and microdrive).

P Smith, Blackburn, Lancs

Memotech users' club

I was interested to read in the ACC news section of *PCW*, January about a club for Memotech owners. I have been a member of Genpat, the Memotech users' club, since the beginning of September. The club offers members discounts of 10-15 per cent on hardware and software, a 16 hours per day answering service and produces a monthly magazine, *Memopad*, which puts to shame the news sheet produced by the Memotech owners' club. On top of this, Genpat has set up its own software label, Syntax Software, and in less than a month it has released 11 titles at very competitive prices.

The fee is £16 per annum which seems expensive, but since joining the club I have saved over £60 on a printer, word processor, Pascal ROM and other pieces of software. In the near future the club will also be producing a speech synthesiser, graphics tablet, light pen and a bulletin board. An exclusive deal with Memotech has allowed the club to offer members a 250k disk drive and RS232 interface for £249 rather than £285.

Genpat can be contacted at 3 Bulcock St, Burnley BB10 1UH.

Tim Rothwell, Bolton, Lancs.

Fallen peach

The remark by Peachtree's manager, quoted by Guy Kewney (*PCW* January) that manufacturers were not pushing Peachtree products, is both ironical and infuriating to anyone struggling to use its software.

Following the recommendations by Epson and my dealer (Transam Ltd), I bought PeachText for use on

A NATIONAL COMPUTER SHOW, THAT'S JUST AROUND THE CORNER

Now you don't have to travel hundreds of miles to see everything that's new in computers. Because The Northern Computer Show is just around the corner. If you are in business—or you're a computer professional—you'll see all the big names; all the new products; all the latest software. All in the comfort of the Belle Vue

exhibition centre right in the heart of Manchester.

What's more, with all the major names and systems in the market on display, The Northern Computer Show will be the biggest, most important computer event in the North. So don't miss this opportunity to catch up. See it all at The Northern Computer Show.



The greatest Computer Show in the North

Bring this advertisement along for FREE admission.

For further tickets write to the Exhibition Manager, The Northern Computer Show, Reed Exhibitions, Surrey House, 1 Throwley Way, Sutton, Surrey SM1 4QQ.

LETTERS

my QX-10. PeachText (previously Magic Wand) certainly rates, in my estimation, as an excellent word processor. But it has some exasperating bugs, the most important being related to page numbering, and starting and stopping at given pages or records. Such functions are vital if you write or translate books where a chapter may run to more than 250k, or if you wish to incorporate data files into specific documents. The catch is that the problems are not immediately apparent, especially as some involve the interaction of two or more commands.

For more than a year I have been trying to get satisfaction from Epson and Peachtree. An 'improved' version (2.0) was promised to replace the original version 2.01, but although this has a few enhancements in other areas, the print functions are even more defective. For example; it refuses to print any document where page numbering starts at a number other than 1. I am now informed that the errors will not be corrected, there being no further support from Peachtree. Certainly there will not be a version to run under CP/M3.

It is quite obvious that Peachtree, probably because of its rush to develop games and educational software for

the US market, has utterly failed to support what may well be its best product. Epson's specific software recommendations also prove to be valueless. The only moral appears to be that even with well-established software and apparently reputable companies, you can never be certain of receiving proper support.

Storm Dunlop, East Wittering, Sussex

Do it in one!

I was very disappointed with the publication in January's issue of the long winded way to put a logo on the Apricot screen: A twenty line program which can be done in one:

```
10 PRINT CHR$(27) + "i*="
```

This will put the logo in exactly the same position.

John Lyth, Keston, Kent

Disk alternatives

Compared to their ever-increasing performance, computer prices are falling continuously. As for disk drives, price cuts are not and will never be as spectacular.

A low-priced home micro costs around £190. The disk drive which goes with it is more like £230. So for the non-professional user, a disk drive is rather expensive for what it basically does —

storing and retrieving data — in comparison with the multitude of basic functions of the cheaper micro (keyboard, video control, music, programming).

A disk drive also has secondary functions: the organisation of the data (copy, delete, merge, directory); these functions make the drive so expensive. An answer would be to have a computer capable of carrying out these secondary functions.

I envisage a micro with 512k RAM, 64k ROM and a fast tape or streamer as a mass storage device. Loading and saving would only be possible in sequential blocks of a fixed length — 192k RAM. This would make the tape operations very simple: a computer controlled start at the beginning and a stop at the end of the block. Without making the streamer too expensive, it still must be possible to load or save a block in less than 15 seconds.

Organising the data before saving would also be very easy: it is only a matter of changing the data locations in the memory. Random accessing would no longer be a time consuming operation. With 512k RAM as memory, it is possible to have two big blocks in the computer for merging and copying of files. Moreover, the DOS could be replaced by a simple and short menu-driven program.

It should be possible to build and sell a micro of this type with a fast tape for less than £230. Besides, the potential computer power is much higher than the 64k RAM machines currently available.

Corman Eddy, Antwerp, Belgium

Brother bother

Last October I bought a Brother HR25 printer and single sheet feeder from Office International of Euston Road, London NW1, at a price which my computer supplier could not match.

Within a day or so of delivery I ran into problems. After contacting Office International by phone I was referred to Brother in Manchester, but still the problems remained. I phoned and wrote and phoned again but with no joy — the printer still gave problems on documents of 40 characters wide while on my other printer, an Epson they printed perfectly. After six weeks of

constant problems I asked Office International to take the printer back.

In desperation to get one particular document printed, I contacted Tailored Business Systems who supplied the Apricot to see if it could help. What a change in attitude — not only did the company immediately offer to print the document for me, it also said it would find the cause of the problem. One of the directors, Denis Sutch, checked out the system and found that the problem was partially due to the Diablo protocol that the Brother is fitted with, and partially due to the program being asked to do too many things at once. Having found the problem, the document was printed successfully.

Service is the key to good dealer/customer relations, and my congratulations go to Tailored Business Systems for the quality of service offered.

The problems that arose over page length were largely caused by the instructions, which invite the user to select the page length using a series of DIP switches on the rear of the printer. However, what the instructions do not tell you is that although a sheet of A4 measures 11½ inches, the switches should be set to the word processing length of 11 inches. The ambiguity should be cleared up by Brother to halt the confusion.

Mike Jones, London NW3

Z80 fast timing

Following your compilation of Benchmark timings presented in PCW January, you may be interested in the following Benchmarks run on the Acorn Z80 Second Processor using BBC(Z80) and Mallard-80 Basics.

BBC (Z80) MALLARD-80		
BM1	0.5	0.4
BM2	2.1	1.5
BM3	7.0	4.3
BM4	7.7	4.5
BM5	8.2	4.8
BM6	11.7	8.3
BM7	16.7	13.5
BM8	21.3	16.2
Average	9.4	6.7

It is interesting to note that the combination of the Z80 Second Processor and the run-only Mallard-80 Basic surpasses in speed all the machines listed in your compilation, with the sole exception of the Sage II.

D Gay, Barnsley

END

BLUDNERS

September's 'Spectrum Function Keys' article (page 178) and October's 'One Step at a Time' (page 132) were less a bludner and more a

calamity. September's hex loader program was incorrect — use October's instead and incorporate the following corrections:

```
71 PRINT INVERSE 1:"ADDRESS";AT
0,10;"CONTENTS";AT 0,20;"INPUT";INVERSE 0
80 LET L=4:LET b=add:GOSUB 1000
90 LET L=2:LET b=PEEK add:LET x=0:GOSUB 1000
105 LET a$=""
220 PRINT AT y,x;a$;" "
240 GOTO 50
1080 FOR i=LEN a$+1 TO 1 STEP-1
```

There were also errors in October's hex dump. The corrections to this are as follows:

EACE ED 2A ... Should read EACF ED 2A ...

```
EBA7 C3 6E EC
EBE5 21 F2 ED 7E F5 23 7E 2A
ED0A E5 ...
EE6B EC D1 C1 78 C5 D5 CD FA
```

And we got Software Arts' American phone number wrong in January's Newsprint story on Spotlight (reviewed in this issue). The company

can be contacted in the UK at 43 Buttermarket, Ipswich, Suffolk. The phone number is (0473) 221551.

END



BANKS' STATEMENT

Eastern rising

All is not quiet on the Japanese front — MSX is stirring. Martin Banks takes cover and observes.

Ever since 1980 there has been a whole boat-load of pundits around, confidently predicting the imminent arrival of the Japanese on the personal computing scene. 'Watch out', the pundits all cried, 'the Japanese are coming and they are going to wipe everyone else off the face of the earth.'

The logic behind this suggestion was quite sound, based on the idea that personal computers, of the home/game-playing variety especially, were high-volume, low-value devices of a domestic nature. This made them the ideal product family for the Japanese to adopt.

That, at least, was the theory. In practice, it didn't work out that way. The Japanese focused most of their attention on the Apple-equivalent market and above, looking to break into the lucrative small business machine area. This required not only good hardware, which they often managed to produce, but good software too. This they failed to come up with. Their operating systems were poor, for one reason or another. It was said, for example, that the OS for the Sharp 3201 machine was truly excellent except for one thing — it was dreadfully slow. It was a full 'belt and braces' system that never got it wrong, it just took forever to do it.

The Japanese missed out on the small business market, which went first to Commodore, Tandy and Apple, and subsequently to IBM *et al*, and missed the boat on the home computer boom, which went to the likes of Sinclair and Commodore.

Now the Japanese are having a concerted pitch at the home market again with the MSX machines jointly developed by Microsoft and a whole bunch of Japanese companies. These have generally been well received by reviewers, who have been impressed with the machines but less impressed with the price, considering what you get — essentially an old-fashioned 8-bit machine that the likes of Sinclair has left far behind.

The MSX family does have one thing going for it already, and has some interesting possibilities for the future. Its present advantage is standardisation. There are a whole range of machines coming from different manu-

facturers that can all use the same software, up to a point. This means that the software authors get a large potential market and become interested in writing for it, which in turn means that the users get programs to play with, plus a choice of machines.

Another advantage of the MSX family is its lineage, which comes from roots buried deep in the dear old CP/M operating system. This means that an MSX system, coupled to a disk drive or two, can become a CP/M machine. Not terribly startling, but the home market is starting to drift upwards in terms of capabilities. People now want to do more than just play 'nuke-the-world' games, and that means two things: bigger systems and better software. It also means that the software has to be available, and that's where CP/M comes in: there's a lot of good, low(ish)-cost applications software waiting to be picked up.

This leads the current MSX machines into a number of alternative routes for the future, stretching from home applications through to real business.

At the home end, it's certain that you will see the machines being applied more and more in association with other systems and equipment. One reason for this is that Japanese manufacturers are now working hard to get the production costs of an MSX machine down to the absolute minimum. The latest versions are said to consist of just seven circuits, which means it will be cheaper to make and smaller to integrate into other things. Yamaha has already pointed the way with its new computer/organ and there will be plenty of other combination products of this type in the future, especially in the area of interactive video.

Most of these applications will be ideal for the 8-bit Z80 processor used in MSX for several years to come, and the standardisation of the technology and software will make it increasingly easy for manufacturers to 'bury' such a computer in their products. But the MSX family is unlikely to stop there.

An important aspect of the standard is its file structure when working with disk drives. These are directly compatible with the existing Microsoft industry

standard for 16-bit personal computers, the MS-DOS operating system. Although it won't run an MS-DOS program, MSX will read data files written under MS-DOS and *vice versa*.

This compatibility is important for the future of the standard, for Microsoft and the Japanese companies have designs upon a certain market-place. That market-place is the one that will be effectively vacated by IBM as it moves its Personal Computer family upwards technologically, and in performance.

Microsoft founder, Bill Gates, talks quite openly about MSX growing into a 16-bit system at some time. There is little doubt that, from the hardware point of view, it could be done already. The standard is already part way to being MS-DOS, and MS-DOS runs on the 8088/8086 family of processors. An MSX machine based on one of these would not be difficult to engineer.

What is important, therefore, is the market timing. IBM is the key here, for this year will see it move its products inexorably upwards. There is already the PC/AT, which is based on the Intel 80286 chip, and there are strong hints of a replacement for the PC itself in the near future. This could well be based on the 286 chip's close relative, the 80186 processor. Although the company is also expected to introduce a lap-held machine this year, which will probably be based around the new low-power CMOS versions of the 8088 chip, such moves would leave a chink of light in the original PC market which would mark the first openings of a window of opportunity for the MSX range.

As the IBM PC family gets more powerful (though still compatible) it will leave a hole at the bottom of the market. This will be at a time when a new breed of users, the small professional individual and the more advanced domestic user, will want the power and performance of the PC without the expense. For performance it is, of course, important to read the words 'working applications software', and that is just what the MS-DOS environment will offer — a wealth of proven applications software. With its existing compatibility and the upward move towards 16-bit processing, this type of machine can be expected. **END**



Illustration by Martin Handford

Star wars

Peter Bright presents a resumé of the new offerings from Commodore and Atari which were on show (or hidden from view) at the CES in Las Vegas, and which will vie for your attention this year.

Computer shows present an ideal opportunity to get advance information and hands-on experience of the machines which manufacturers would otherwise try to keep under wraps. Escaping from the January freeze in the UK, I went to the Consumer Electronics Show in Las Vegas, and spent four days fighting off the other visitors who also wanted to be first to use the new machines.

It was the Commodore and Atari stands which had the most to offer. The competition between these two companies has always been intense, but it was heightened last year when ex-Commodore boss Jack Tramiel took over the reins at Atari. Now both companies have new machines on their books which will bring them into even closer combat, and which will also challenge Sinclair's QL.

Commodore's C128 and Atari's ST micros are similar in one important respect — both are attempts at 'cross-over' machines between the home and business markets.

But while Atari's other new offerings, a range of 8-bit machines based on the 800XL, are aimed more squarely at the home market, Commodore's new products are emphatically upmarket and represent an interesting change of pace for the company.

Commodore

On the Commodore stand were a battery-powered LCD display notebook micro, the much-rumoured C128, and an IBM-compatible business machine.

The Portable Computer

The first thing you notice about the Portable Computer is that it looks good! It comes in a compact off-white 2.1 × 10.5 × 11.7in package with a hard cover which hinges back to allow the LCD display to flip up. This all smacks of careful design. Could this be the same Commodore who gave us the downright ugly 64?

The main processor inside the Portable Computer is a 65C102; this is an enhanced CMOS version of the old 6502 processor with a few extra commands built in. It's similar to (but not exactly the same as) the 65C02 used in the Apple IIc. The processor is clocked at a fairly measly 1MHz.

As standard the Portable Computer is supplied with 32k of CMOS RAM, and 96k of CMOS ROM which holds the applications programs. The machine also has a spare ROM slot under the top cover which can take extra ROM-based software.

All the electronics are based on CMOS designs, so you should be able to get about 15 hours use out of the four AA batteries which the machine uses.

One of the good things about the Portable Computer is that it's loaded down with I/O facilities. It has a built-in 300 baud direct connect modem, but unlike most other American machines, this modem can work on British CCITT

'The competition between these two companies has always been intense, but it was heightened last year when ex-Commodore boss Jack Tramiel took over at Atari.'

standards as well as American Bell standards. This means that we should be able to use it in this country as soon as it's released, as long as Commodore can get it approved. However, at the moment Commodore UK is being very cagey about launch plans.

As well as the direct connect output, the Portable Computer has provision for acoustic cups so that you can use it with a telephone handset if you don't have access to a jack plug. You can also plug a special handset into the Portable Computer so that your line can be used as a normal telephone without the machine being unplugged.

Other I/O facilities include a Commodore serial port so that you can use any Commodore 64-compatible peripherals such as the disk drive or printer, an RS232 serial port, a Centronics parallel printer port and a bar code reader. Considering that Commodore is infamous for never using standard interfaces, this is a very impressive list.

The machine display is an 80-column by 16-line liquid crystal display (LCD);

this is Commodore's own make and it's good. The usual problem with large LCDs like this is that they are difficult to read, but I found the Commodore's LCD excellent in this respect. Even in poor indoor lighting it was easy to read, and it shows what can be done with large LCDs if you try.

When it's released, the Portable Computer will come with a word processor, file manager, spreadsheet, address book, scheduler, calculator, memo pad, terminal emulator, Basic and a machine code monitor built into the ROM.

Only the word processor, spreadsheet and terminal emulator were available on the machine I looked at. All the applications make heavy use of the eight programmable function keys and use the last line of the display to label them. One of the most interesting things about the unfinished applications programs was their speed — considering that the machine only uses a 1MHz 6502, they really were quite fast.

Interestingly, the memo pad and the calculator are available at any time just by hitting a function key from within an application. This means that if you have an idea while you are in an application, you can call up the memo pad and write it down.

At the time of going to press Commodore wouldn't give any specific indication of what the Portable Computer will cost.

The C128

There have been strong rumours about the C128 for quite some time. Most have been proved accurate, although again Commodore UK is keeping quiet about the machine.

Like the Portable Computer, the C128 looks quite attractive. Although it is packaged in a low-profile casing, it's still a large box and takes up more table space than you would expect for a home machine.

The main feature of the C128 is that it's actually three different microprocessors (6510, 8502 and Z80) in one box. This allows it to operate in three different modes: C64 emulation, native C128 and CP/M. The machine can sense if you have plugged in a C64 cartridge or if you have a CP/M boot disk in the drive, and switches itself to the correct mode



The Atari ST and the Commodore 128 — battling for personal computer power

automatically. You can also switch modes under software control.

Commodore claims that the C128 is 100 per cent compatible with C64 hardware and software when it's in C64 emulation mode. One of the engineers on the stand said that he had quite a problem persuading a well designed machine like the C128 to behave like a C64. I can believe it.

In C64 emulation mode, the C128 uses the 6510 CPU running at 1.02 MHz, a 6581 sound chip, 64k of RAM and 16k of ROM. Just like the C64 you get a 320 x 200-pixel display with 16 colours and eight sprites, and you can even plug C64 cartridges into the machine. Commodore says it has tried all the C64 cartridges it can find, and they all work.

In its native C128 mode the machine uses a 8502 processor, 6581 sound chip, 128k of RAM and 64k of ROM. The RAM can be expanded up to 512k but 128k is the maximum system RAM: the rest is used as a RAM disk.

The display operates in one of two modes — high-resolution 640 x 200 or medium-resolution 320 x 200. In the latter mode you can have 16 colours and eight sprites which can be accessed via a new super-friendly (for Commodore) Basic version 7.0.

Native C128 mode also allows you to make use of the high data transfer rates on Commodore's new 1571 disk drive. Although you can use this drive in C64 mode, it only operates at the C64's (slow) speed.

The CP/M mode uses the built-in Z80

microprocessor. It represents part of a new trend within Commodore towards more standardised systems.

In this mode the C128 is turned into a fairly standard 8-bit CP/M machine. It uses CP/M Plus which allows it to access the C128's 128k of RAM. You can take the RAM up to 512k as long as you use the extra as a RAM disk.

CP/M mode operates in either 40- or 80-column screen widths and can display up to 16 colours onscreen. It makes use of the new 1571 disk drive which can read Kaypro and Osborne CP/M-80 disks.

Commodore demonstrated the C128 running the Perfect suite (Perfect Filer, Perfect Calc and Perfect Writer) in CP/M mode, and says it will run the most popular CP/M-80 applications software.

As far as I/O is concerned, the C128 is fairly standard Commodore—user port, cassette port, serial port, two game ports and a cartridge port. Its main claim to fame is that it offers composite video, RGB and TV video outputs, so it shouldn't be difficult to hook up a monitor.

The keyboard on the C128 is interesting because it hints at the multiple modes of the machine. At first sight it looks like a standard full-function keyboard with its separate numeric keypad, programmable function keys and main typing area. However, a closer look reveals two sets of cursor movement keys, one along the top and another at the bottom of the typing

area. This makes sure that the keyboard, as well as the electronics, is compatible with the C64.

Although the C128 seems to function well enough in its different modes, it's difficult to imagine many people wanting the ability to run C64 programs and CP/M programs. It remains to be seen how many software houses will write for the machine's native C128 mode.

IBM compatible

Also at the CES was Commodore's IBM PC-compatible business machine. However, unlike the other two machines, this one was hidden away in a private room on the stand to keep it from general view.

Not long ago, the idea of Commodore selling a PC compatible would have been unthinkable. Commodore prides itself on being different from the rest and being able to survive on its own technology, but the failure of recent Commodore business machines has apparently forced a rethink.

Commodore hasn't given in completely, however. This machine will only be sold in Europe and will not be available in the US. It was also on display at the *Which Computer?* Show and is expected to be available in the spring at a price of under £2000.

Peripherals

In addition to the new machines, Commodore was also showing a range of new and revamped peripherals. The most interesting of these is its new 1571 disk drive.

The main advantage of the 1571 is that it transfers its data much faster. Unfortunately you only get this extra speed if you use it with a C128.

Essentially the 1571 works in three modes: C64, C128 and CP/M. If you use it with a C64 it works at the same old slow 300cps; if you use it with a C128 the speed goes up to 1500cps. With a C128 running CP/M, the speed goes up to 3500cps. This is fine if you have a C128, but if you use it with a Commodore 64 you're no better off.

Commodore was also showing a compact Sony 3½in microfloppy unit, but it would say nothing about pricing and availability.

Atari

Ever since its early days of heady success, Atari has been in the doldrums. Until recently Atari was owned by the American entertainments giant Warner Brothers, but during this time it did little but lose money. Warner Brothers decided to sell.

Now enter the portly figure of Jack Tramiel fresh from Commodore. Tramiel and his clan have the reputation of being hard men and their arrival at Atari was accompanied by howls of despair from some quarters within the company, but it's significant that a large number of staff left Commodore and followed their leader to Atari.

There's no doubt that Tramiel's



The Commodore Portable Computer — it's loaded down with I/O facilities, including a direct connect modem

arrival has transformed Atari: a wide-ranging programme of new product development under the banner 'Power without the price' was begun; the projected new range of machines and peripherals stretches from 8-bit machines right up to a full-blown 32-bit business machine. The one trait that all the machines share is an extremely competitive (some would say suicidal) pricing policy.

Atari chose the January CES to show the first stage of its new products and peripherals. First are four new 8-bit models based on the popular 800XL home micro, and second are two new 16-bit machines based on the powerful Motorola 68000 processor.

65XE/65XEM/65XEP/ 130XE

The four new models in the '65' range are all broadly the same in that they are based on the successful but long in the tooth 800XL home computer. Atari claims that all the 65 series machines are compatible with the 400/800 series software and peripherals, including the 1050 disk drive.

The base model of the 65 series is the 65XE; this is based around a 6502C central processor linked to 64k of RAM. As you would expect from an Atari home machine its strong features are graphics and sound, both of which are

controlled by custom-designed control chips. Programming is achieved via Atari Basic.

The graphics capabilities of the 65XE include a 320 × 192-resolution display, 11 graphics modes and a palette of 256 colours. In addition there are five text modes and the traditional Atari 'Missile' sprite graphics. As far as sound is concerned, the 65XE features four programmable voices.

Externally the 65XE is very different from the old 800XL machine. The casing is the same off-white/grey that seems to be the Atari trademark. It features a full travel keyboard with the traditional 800 series function keys moved along the top of the main typing area. The result is pleasing and is vaguely reminiscent of the Commodore Plus 4. The only disadvantage of the new design is that the cartridge slot has been relegated from the top to the back of the machine where it's far more prone to knocks.

The other machines in the 65 range are similar to the 65XE but offer specialised advantages. The 65XEM offers far more comprehensive sound capabilities than the 65XE. Instead of having four basic voices, the 65XEM offers eight voices and 64 harmonics, and high-quality sound is achieved through a sampling rate in excess of 30KHz.

The 65XEP is a portable version of the

65XE. In addition to the basic electronics of the 65XE, the 65XEP also includes a built-in 5in monochrome monitor and built-in 3½in Sony micro-floppy disk drive. This is all contained in a large portable box.

The final model in the 65 range is the confusingly-named 130XE. Despite its '130' tag, it has the same electronics as the 65XE with the addition of an extra 64k of RAM to bring the total RAM count up to 128k.

Pricing for the 65 range hasn't been fixed yet. All Atari will say is that the new models will start at less than the 800XL costs at the moment, which is £129 at the time of writing.

130ST/520ST

The 130ST and the 520ST are the first of Atari's new generation of powerful personal computers. They are both basically the same machine — the only difference between them is that the 130ST is supplied with 128k of RAM whereas the 520ST comes with 512k.

The styling of the new machines is very similar to that of the 65 series machines — very neat integrated lines in the same off-white/grey colour scheme. The keyboard is a full-function, full-travel unit with separate typing area, cursor control block and numeric keypad. The unit also incorporates 10 function keys integrated into the top of the casing.

The main processor in the ST range is the Motorola 68000 16/32-bit processor; this is the same processor that is used in some of the fastest personal computers on the market today. It's also similar to the processor used in the Sinclair QL, the only difference being that the QL uses a cut-down version while the ST uses the full-blown 68000.

Both machines come with 192k of ROM holding the operating system

friendly Macintosh-like environment which makes full use of mice, ikons and pull-down menus to make the system as simple to use as possible.

The basic idea is that the screen looks like a desktop with papers on top of it. The screen has a menu bar running along the top with various options, and has ikons running down the side representing the disk drives. Using the mouse which is supplied with the ST

are suitable for your machine. To complement the new high-power ST machines, printers, monitors and disk drives were on show.

There are two disk drives available for the ST machines. The first is a 500k Sony 3½in microfloppy unit; this attaches to the fast disk interface on the ST machines. Two versions of the disk drive were on display: one was a free-standing unit and the other was incorporated into the housing of a high-resolution monitor.

Conclusion

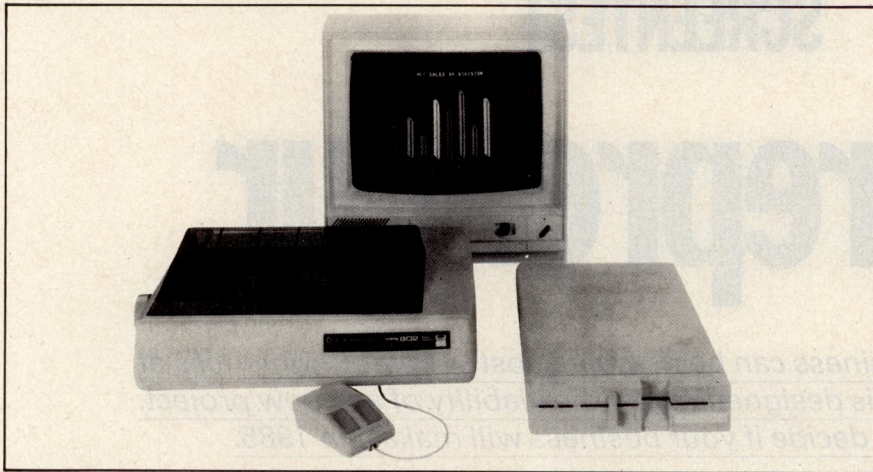
Although they may seem different on paper, the Commodore C128 and the new 16-bit Atari ST machines are similar in some important respects.

Both machines offer facilities which are a combination of home and business micro. Look at the C128: if it's a home machine, why give it CP/M? Or if it's a business machine, why give it C64 capability?

The same holds true for the ST machines. The processor, Digital Research operating system and RAM all cry out 'business machine'. If this is the case, why give it Logo and a Midi synthesiser interface?

These machines are following the lead of the Sinclair QL in that the companies realise that the home games market can't hold up forever. So they're trying to shift some of their eggs out of the games micro basket without actually going all the way with out-and-out business machines.

Whether this strategy will work or not is open to doubt, and obviously a final opinion will have to wait until we can Benchtest the machines thoroughly.



Portable Computer peripherals, including an ultra-fast disk drive

(this can be expanded to 320k by plugging in extra ROM packs), and both machines also come with Basic and Logo built in.

As standard the ST range comes with composite video, and RGB and TV video outputs. The display is fully bit-mapped into a 32k chunk of RAM and operates in three modes: 320 × 200 with 16 colours, 640 × 200 with four colours or 640 × 400 in monochrome. The machines have a palette of 512 different colours.

Music is provided by three separate internal voices and a Midi synthesiser interface. The inclusion of this interface allows you to use the ST machines to control a wide range of popular synthesisers. This is the only personal computer I know of that comes with a Midi interface as standard.

Mass storage can be provided by the optional floppy disk drive or the hard disk, and the machines are provided with a floppy disk controller, hard disk interface and direct memory access facilities as standard.

In addition to the disk interfaces, the machines also come with an RS232 serial port, a Centronics parallel printer port and two joystick ports as standard. One of the joystick ports is configured to work with the mouse which is supplied with the system.

One of the most interesting features of the ST range is that it is supplied with Digital Research's Graphics Environment Manager (GEM) as standard. In this implementation, Digital Research has extended GEM to include the unfortunately-named operating system TOS (said to stand for Tramiel Operating System!).

I took a close look at GEM last month, but for the uninitiated it's a super-

machines, you can move the cursor arrow to select ikons or to invoke a pull-down menu from the menu bar.

Although GEM will run on a wide range of machines, the ST machines are the first personal computers I've come across which have it as standard. During my short time with the machines it certainly did make them much easier to use than traditional operating systems.

Although UK prices hadn't been fixed



The Atari 130ST — a powerful personal computer

at the Show, preliminary US prices had been set at \$299 for the 130ST and \$499 for the 520ST. This represents extremely good value for money. Early indications are that Atari is aiming to sell the machine in the UK from May onwards, at prices starting from about £300.

Peripherals

Along with the new machines, Atari was showing new peripherals. It has introduced a colour coding system so that you can find out which peripherals

However, it has to be said that Atari are in an especially vulnerable position if they try to sell the ST to business. Selling business machines in quantity requires different distribution channels from home machines. And the fact that Atari is trading on price means that there will be precious little money left for the dealers and distributors.

Software could also be a problem for the ST. Atari says that all the major software houses are writing for the machine. I'll believe it when I see it. **END**



SCREENTEST

Entrepreneur

Launching a new business can be risky and costly. Peter Bright looks at Entrepreneur, which is designed to test the viability of any new project. It can help you decide if your business will make it in 1985.

'Now you can do something useful with your home micro.' The number of times I've seen these words and then had my hopes dashed as I look at yet another appalling piece of 'serious' home computer software.

But now it looks as if you may at last be able to do something useful with a home machine. Brentwood-based Triptych Software has released a range of good-looking packages for home machines. Although the Triptych programs run on a range of different home machines, I received them in their most recent versions, running on an Amstrad with the new disk drive unit attached.

Four Triptych packages were supplied with the Amstrad: Entrepreneur, Project Planner, Decision Maker and Star Watcher. I'll concentrate on Entrepreneur here.

Entrepreneur

Entrepreneur is best described as a small business modelling tool. Sup-

pose you have an idea for a small business and you want to work out if it could be viable. Using Entrepreneur you can feed in projected sales and costs, and the program will produce cash flow projections, a profit and loss account, balance sheet, and so on. It also provides the information you need to assess the project.

As with the other Triptych packages, Entrepreneur has three main parts: the main program, the tutorial, and the manual. On the Amstrad the tutorial was on side A of the disk and the application program on side B.

Tutorial and manual

Both the onscreen tutorial program and the manual are designed so that you must use them both. This curbs the temptation to rush from screen to screen and only read the manual when problems occur, which is a bad way of learning as you could miss important information in the manual.

The Entrepreneur tutorial prevents you doing this by forcing you to use the manual. If you load up the tutorial and try to run through it, you soon come across a message like: 'Please refer to chapter X for instructions on how to proceed.' The only way you can persuade the tutorial program to go any further is to enter the correct code into the machine. The only way to find the code is to read the manual! Clever.

Reading the manual is a very rewarding experience. It begins with lots of good advice on how to analyse whether or not a business will work. It shows you how to produce a business plan and forces you to think about the many difficult aspects of the venture. The last part of the planning section is headed 'Have you been honest?', and finishes in ringing tones with 'Remember; the harder you plan, the luckier you get!'

The rest of the manual is designed to be used in conjunction with the computer: for example, the manual makes a

CASH FLOW	
December	
Opening Cash	7364
Cash Out	3876
Cash In	4048
Closing Cash	7536
January	
Opening Cash	7536
Cash Out	2525
Cash In	3450
Closing Cash	8461
February	
Opening Cash	8461
Cash Out	2515
Cash In	1932
Closing Cash	7877
End Of Year	
	7077

Continue

Cash flow screen

Profit & Loss	
Sales	32160
Cost Of Sales	13387
Contribution	18773
Wages	11012
Expenses	4258
Depreciation	237
Interest	400
Profit Before Tax	2865
Taxation	1958
Profit After Tax	908

Continue

Profit and loss screen

point and explains it, then the computer demonstrates the figures on the screen.

The computerised tutorial is divided into six sections: 'Using Numbers', 'The Balance Sheet', 'Making a Profit', 'Having Enough Cash', 'Value Added Tax' and 'Balance Sheet Display'. These sections introduce the basic principles of accounting assuming no knowledge of accounting practice.

Using Numbers introduces the idea of double-entry accounting and uses the balance sheet as an example. Indeed the balance sheet is used as the basis for the examples for most of the tutorial.

'Both the onscreen tutorial program and the manual are designed so that you must use them both. This curbs the temptation to . . . only read the manual when problems occur . . .'

The Balance Sheet introduces fixed assets, equity, stock, debtors, creditors, cash, profits and term loans. These are all explained using the example of Joe the lobster seller who wanders through the tutorial carrying out progressively more complex transactions.

Making a Profit is one of the most important sections of the tutorial. It introduces expenses, depreciation of assets, and finally introduces the profit and loss account. It also shows how to calculate overheads and contributions, and how to work out a break-even analysis.

Having Enough Cash gives worked examples of cash flow and shows you how to calculate your working capital needs.

Value Added Tax shows how VAT works and explains corporation and income tax.

Finally, Balance Sheet Display allows you to enter your own figures into the balance sheet.

I found the combination of the computer tutorial and the manual very impressive. I particularly liked the manual, which is full of information. The planning section at the beginning was very good, and the appendix on sources of assistance for the small business was a nice touch.

The manual includes a book list for those who want to read more on small business planning. One book they recommend which I must read is called *The Genghis Khan Guide To Business*. If the book is as good as the name, it must be worth looking at.

Applications program

There are actually two versions of the Entrepreneur applications program: Single Product and Multiple Product. As its name suggests, the Single Product program assumes that your business is selling one product; its advantage is that it can deal with more data about the product. Multiple Product allows up to 10 different products to be included in the business.

Before you can do anything useful with Entrepreneur, you have to gather a wide range of information to feed into the program.

If you think about it, this is the first stage of the business analysis. Without performing a single calculation, Entrepreneur forces you to think hard about the costs and revenues of your projected business in order to formulate the first stages of the business plan.

It is obvious that the figures you get out of Entrepreneur will only be as good as those you feed in. If you just pull costs out of thin air then the projections will be meaningless, so some thought is required at this stage.

To help you gather the information Entrepreneur needs, the manual explains what the figures mean and provides figures for an example company to show how the package works. The manual also includes pre-printed data entry forms which you can photo-

copy and fill in so that you have all the necessary data to hand when you run Entrepreneur.

In use

Entrepreneur displays data entry screens with the question on the left-hand side of the screen and a space for the answer on the right. A two-line window at the bottom of the screen gives handy hints on what the right answer should look like.

When you have finished with a screen you can hit ESCape. This will give you the option of continuing to the next screen, or calling up the full-screen

'I've seen so many so-called business packages on home machines that aren't worth the tape they're recorded on. Entrepreneur is refreshingly different.'

editor and altering data on the current screen.

The first thing the package needs to know is what your company is to be called and what type of business it is. The program can handle the three main types of business — sole trader, partnership and a limited company. It requires information about any fixed assets (land, buildings, and so on) that you'll buy, how much they'll cost and when you'll pay for them.

This led to my first problem. I couldn't make the program believe that I paid for my fixed assets by a single cheque rather than multiple payments. It turns out that the package used to have a 'single payment' option, but that later versions had this option incorporated under an 'irregular payments' heading. Once I was told this everything was straightforward, but perhaps the

Balance Sheet	
Fixed Assets	
Capital	1212
Depreciation	- 237
Current Assets	
Stock	2195
Debtors	1012
Cash	7077
Shareholders Funds	
Equity	4500
Profit & Loss	908
Liabilities	
Long Term Loan	2500
Overdraft	0
U.A.T.	0
Tax Due	1958
Creditors	1116

Continue

Balance sheet screen

Change		Profit
Sales	+10%	+ 145%
	-10%	- 324%
Sales Costs	+10%	- 103%
	-10%	+ 51%
Wages	+10%	- 560%
	-10%	+ 85%
Expenses	+10%	- 49%
	-10%	+ 33%
Depreciation	+10%	- 2%
	-10%	+ 2%

Continue

Sensitivity analysis screen



SCREENTEST

manual could be made clearer.

You then move onto expenses: for example, rent, heating, lighting, as well as entering how much these will cost. You also have to state whether each item will be paid for by cash or credit, whether VAT is payable, how frequently you will be invoiced and when the first invoice will come in.

The next cost you have to calculate is how many staff you will take on and at what salary; it was here that I came across my second problem. Occasionally the Amstrad got tired of running *Entrepreneur* and decided that life would be much more exciting if it did a spot of garbage collection. The first time this happened I was convinced that the program had crashed—I was in the middle of inputting data when it locked up. I was just about to reset the machine when the Amstrad finished cleaning itself up and was ready for action.

There was no way of predicting when this would happen and it locked up for 20 to 30 seconds. Once I found out what was happening I didn't worry too much, but it was very annoying. According to Triptych this doesn't happen when *Entrepreneur* is running on any other home micro—it's just one of the funny quirks about the Amstrad.

The next section allows you to enter projected costs and sales for your product. If you are doing single-product analysis, you can enter costs for the raw materials that go to make up your product. If you are doing multi-product analysis, you just enter the direct costs as a percentage of the selling price. After this you can enter your projected sales figures for your product(s) on a month-by-month basis.

Analysis

When you have entered the projected sales figures, the program has enough data to start producing figures.

If you are doing single-product analysis, the first thing that the system works out is projected year end stock levels for all the raw materials. Ideally you should keep stock levels as low as possible to avoid tying up working capital but without running out. If you will run out of stock during the year, the program will tell you and allow a revision.

The screen then shows a break-even analysis for your business and displays projected sales, so you can see if you will reach your targets.

This display is a good example of one of the things I don't like about *Entrepreneur*. Throughout the package, figures are displayed on screen without any heading to tell you what they mean. For example, on this screen, the top few figures represent pounds sterling while the rest relate to product units. It isn't always obvious which is which.

Next, *Entrepreneur* generates a preliminary monthly cash flow projection.

The cash flow display shows the consolidated figures for each month and for the year end, showing the opening balance, cash out, cash in and the closing balance. I was worried when I found that the last month of the year invariably didn't balance; according to Triptych this is because of year end tax payments. The preliminary cash flow analysis will give you some idea of how much finance you will need to run your business.

The finance plan is the last piece of information that *Entrepreneur* needs to be able to generate the projected year end accounts of your company.

The first of these is the profit and loss account. This lists all income and expenditure and then works out the projected profit (or loss). The system will also work out a projected year end balance sheet.

One of the most interesting reports that *Entrepreneur* can generate is the sensitivity analysis screen. This shows how a $\pm 10\%$ change in sales, sales costs, wages, expenses and depreciation would affect profits.

This can generate some extremely interesting figures. For example, in my 'Bright Enterprises' model a 10% increase in wages would lead to a staggering 1314% fall in profits. No pay rise this year, folks! The final analysis screen displays different ratios. The

first two are debtors' and creditors' turnover rates in days. The final figure is profit as a percentage of assets.

You can easily spend an evening just playing around with the figures and projections, and generally tinkering with the system. Once you have looked at the initial figures you can use the menu to go backwards and forwards, altering the input, and then re-run the analysis to see if any improvement has been made.

My only criticism in this area is that it can be time-consuming to go back, alter one figure, and then have to wait until the Amstrad has churned through all the figures again. Although with the figures can be fun, it can also be quite dangerous. It's very tempting to up the sales figures by 10% because you know it will pull up your profit. The problem is that if your original sales figures were honest, you would be introducing a distortion into the model.

Conclusion

I was very impressed with *Entrepreneur*. I've seen so many so-called business packages on home machines that aren't worth the tape they're recorded on — *Entrepreneur* is refreshingly different. The back-of-an-envelope planning brigade have no excuse now. *Entrepreneur* is available on low-cost home micros (including the Sinclair QL) at prices starting at £15, and it does a good job.

What makes *Entrepreneur* so good is not so much the program, but the manual. Where most manuals would limit themselves to telling you how to use the package, the *Entrepreneur* manual goes further and, above all, it forces you to think hard about your business.

END



'We can't complain. Computer fraud's been good to us!'

PAM COMPUTERS



apricot

FOR YOUR FIRST COMPUTER SYSTEM

When you buy a system from PAM COMPUTERS that is not all you get, with each system comes advice, training and ongoing support. We will advise you on the right system for your business having first assessed what your needs are.

COMPLETE BUSINESS SYSTEMS

APRICOT with 2x315k disks	£1899
SANYO MBC555 with 2x160k disks	£1369
SANYO MBC555Q with 2x320k disks	£1599
SANYO MBC555-2 with 2x360k disks	£1669

Included in these prices is a printer, everything you need to set up your first system, plus free software and 2 days on-site training. The SANYO systems include the SAGE integrated accounts package. All prices exclude vat.

CALL US AND ASK ABOUT OUR SOFTWARE PRICES, NORMALLY 30% OFF RRP.

Please **PHONE** for more details

3 TENNYSON ROAD, ASHFORD, MIDDX. TW15 2LN
(07842) 48972



AUTHORISED DEALERS
FOR TELEVIDEO • EPSON
HEWLETT PACKARD •
CONTROL DATASET ETC

ULTIMATE SERVICE

DP Managers	— One Shop Supplier/Service/Advice
Mail Order	— Discount Prices/Vast Product Range
New Users	— Low Cost Entry/Systems Analysis
Dealers	— Monitor/Printer Distributor
OEM	— Manf. S100 8086 MS DOS Computer

We Specialise in Service — Example Prices

NETWORKING — IDE•NET for IBM PC	
ONCE ONLY SOFTWARE	£299
NETWORK BOARD PER M/C	£450

SPECIAL SANYO MBC 555	£880
128K MEMORY WITH FREE SOFTWARE	

SPECIAL BRAID TELEX MANAGER	
COST SAVER ON IBM PC	£1,750

SPECIAL EPSON LQ 1500	£850
DUAL MODE, QUALITY PRINTER	

Ring or Write for Full Price List

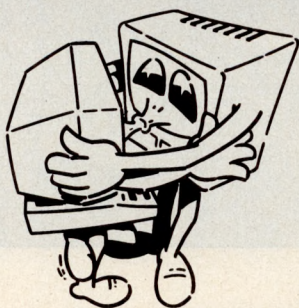
DAYSTAR COMPUTERS LTD

UNITS 4 and 5, NEW ROAD
NEWHAVEN, SUSSEX BN9 0EU
PLEASE TEL: 0273 514874

Name.....
Address.....
Tel.....
Interest.....

SWAP

MICRO TO MICRO
FILE TRANSFER
SYSTEM



"Get your microcomputers talking to each other!"

SWAP allows you to transfer any programs and data between 2 computers of different manufacture. SWAP consists of 2 floppy disks and a cable configured for your 2 chosen computers. Here are some of the formats available:

IBM PC	IBM Compatibles	Sirius
Apricot	Apple (CP/M)	HP150
Televideo	Superbrain	BBC
Sanyo 555	DEC Rainbow	Kaypro

If your format is not in our extensive range we can usually produce it at little or no extra cost.

The price of SWAP is £158 (£135 plus VAT and postage and packing). Please specify your computers when ordering.

MERCATOR COMPUTER SYSTEMS LTD
3 Whiteladies Road, Clifton, Bristol BS8 1NU.
Telephone: (0272) 731079
Telex 44220 Comtel Ref 247

MERCATOR
COMPUTER SYSTEMS

ULTRACALC 2

Upgraded version now available!

Ultracalc, the successful spreadsheet program from BBC Publications, has now been upgraded to increase its power and flexibility. New features include:

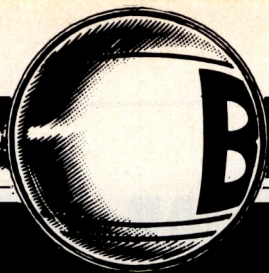
- Operation in any screen mode
- Greater printer flexibility including control codes and £ sign definition
- Runs as 'HICALC' on a 6502 second processor to allow 44k of workspace in any screen mode
- Spooling of ASCII text files for subsequent use with any word processor
- Several additional layout options
- Supplementary manual containing a wealth of information on how to use Ultracalc.

£79.50 (inc. VAT)



If you already have a copy of the original Ultracalc, you can exchange it for the new version for just £6.25 inclusive of VAT, postage and packing.

Write for an application form to Software Editor, BBC Publications, 35 Marylebone High Street, London W1M 4AA, enclosing a stamped addressed envelope.



BENCHTEST



North Star Dimension

The North Star Dimension couples a multi-user, IBM-compatible environment with the capability of running familiar applications programs. Considering its other marked advantages, how will it fare in the same market as the IBM PC/AT? Martin Banks finds out.

There is a growing body of opinion that suggests that small multi-user systems, capable of handling a small number of users, will find an important niche in the market. Such systems will service the needs of small to medium sized companies that want, say, two or three people doing accounting work, two or three writing reports, and a couple working on budgeting and similar spreadsheet activities.

For these users, the traditional options have been to go for a small minicomputer-based multi-user system—and risk bankruptcy trying to pay for it—or to opt for a collection of standalone machines and perhaps networking them.

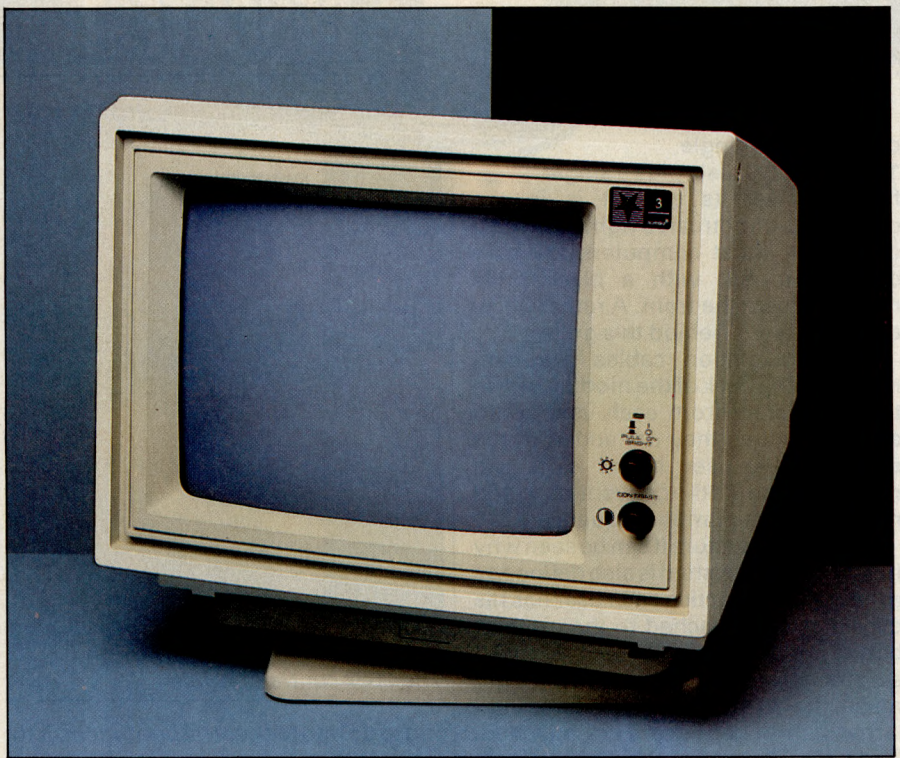
The new Dimension from North Star Computers cuts this dilemma down to a manageable size by providing a multi-user (or, more accurately, a condensed network) IBM-compatible system that is price-competitive with a collection of standalone machines, and which offers some considerable advantages.

Hardware

To the dedicated desktop user, the first impression of the Dimension is its size. The machine comes as a large box which is designed to stand all by itself on the floor. The user workstations, on the other hand, are small and neat affairs which look good on a desk. Between the two elements of the system are strung thick, 25ft-long connector cables. At some 60lbs in weight, the one thing the Dimension isn't is portable—but this is not a great drawback.

The system is intended for those users who have a reasonably clear idea of what they want and who feel they can go some way to realising their ambitions.

The machine is this big because of the way it is constructed and operated. With the Dimension, North Star has



The standard monochrome/green monitor has brightness and contrast controls

brought together into the central module of the system a collection of IBM PC clones. Each system user (there can be up to 13 in total but 12 is considered the normal maximum) has his own personal computer within the module.

The key element of the machine is the special internal IBM-compatible bus motherboard; this is controlled by an Intel 80186 16-bit processor running at a respectable 6MHz. This processor drives the one or two hard disk drives the system can mount, the IBM-compatible 360k 5¼in floppy drive and the optional tape cartridge system. It has its own 256k of cache memory which it uses for such tasks as program loading and print spooling.

Expansion boards are available for

the central module cache memory, taking it up to 512k bytes, while there are two options available for the workstation boards, adding either 128k or 384k to the standard 128k bytes with which it is equipped. To gain entry to the module, or to add either these boards or a new user, the machine must be laid on its side and the three screws holding the cover in place removed. This is not something which should be attempted on a regular basis: it involves a DOS routine to lock in place the flying heads of the hard disk being used and the total system should be closed down. The workstation boards slide into place and are located by screws. Expansion memory boards mount over their respective boards on pillars.



The Dimension keyboard is manufactured by the same company that made the IBM PC keyboard

The central module comes with a single 15Mbyte hard disk, plus a single floppy drive. Its cabinet is in the classically unobtrusive light fawn colour which most computers are now clothed in, but with a black grille running down the front. A rather noisy cooling fan sits behind this grille.

The workstation cables are connected to the back of the module where the connectors from each user board are exposed as they are added to the system. The user board slots are numbered, so it's the convention to add new boards in number sequence.

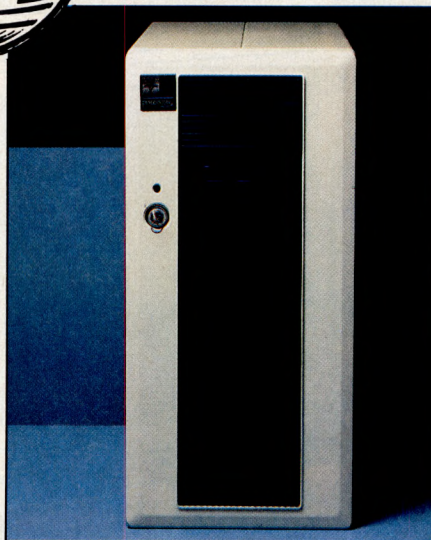
From this structure it can be seen why this multi-user system is also defined as a network: in practice each user has his own machine attached to the motherboard rather than all the users accessing a single processor system. The end result, however, is fairly academic until larger numbers of users are attached. Then it's likely that the Dimension's construction will allow it to run faster than a more conventional multi-user approach.

The central module is equipped with two serial ports, one an RS232 and one programmable, and one Centronics-compatible parallel port. It can work with any and all of the peripheral devices available for the PC family and its many clones, and is turned on and off by a key switch mounted on the front panel.

The workstations come in four parts. The keyboard is a standard 84-key device which incorporates all the things one would expect of an IBM-compatible unit manufactured by the same company that produced the PC keyboard. It has a good feel and a similar tilt mechanism to the PC on the bottom to bring the back of the unit higher. This is also used to lower the front end of the keyboard so that it complies with West German VDE standards, which specify the height of the front edge of the keyboard from the desk.

The screen is a standard monochrome/green, and the display unit has an on/off and brightness control plus a contrast control. North Star states that a colour unit is expected later this year, but the current 12in monochrome unit is fully capable of running the same level of graphics-based applications as the IBM PC family. Resolutions available are 640x200 and 640x400 pixels.

Both the keyboard and the display plug into the third element of the workstation, the connector cable; this comes equipped with a small connector box into which the two units are plugged. Its most important function, however, is to house a parallel port which allows a local printer to be connected. Using this, an individual user can obtain printouts without hav-



The 256k central module

ing to go into the central printspool or to where the central printer may be located. This port can also be used with a mouse or modem if required.

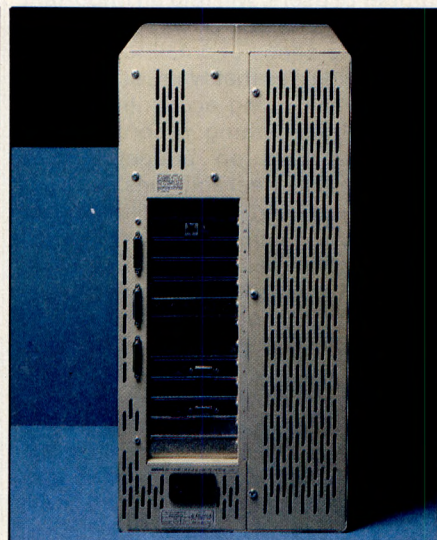
Also on the workstation is the processor board which sits inside the central module. It uses an 8088-2 processor with a minimum of 128k. This -2 version of the processor runs at a respectable 7MHz clock speed, which contributes significantly to the speed of the system.

The overall feel of the workstation is fine, apart from the lengthy screen decay time. The keyboard feels solid, and has a good action. The screen is easily legible in a variety of lighting conditions, from direct sunlight to pitch-dark-and-small-table-lamp. The display measures approximately 12ins square, while the keyboard is around 14 x 6ins. With no system box, the desktop footprint is small. In the test system I had two terminals standing easily side by side on a desk measuring 3ft 6in by 2ft, which gives some idea of their size. As with most systems, the keyboard is connected by a 6ft-long coiled cable so it can be 'lap-mounted' when required.

System software

Two levels of system software are supplied with the Dimension. There is the operating system itself, which controls both the central module machine and the individual workstation processors, and the system management software through which a designated individual, the system manager, takes care of the system's housekeeping and performs such tasks as adding new users.

The operating system is North Star DOS which, in the test machine, was version 1.1.0. This is not as intimidating and 'different' as it sounds: it's essentially a version of Microsoft's MS-DOS. The main differences are the inclusion of some additional commands specifically geared to the requirements of the



The heart of the system

Dimension machine, and the way it is operated.

The main advantage of using MS-DOS as the basis of the machine is obvious, however. As with the main thrust of the hardware design, the key element is to maintain as much compatibility with the IBM PC as possible. This means that the Dimension will run the majority of applications programs available for the PC family, including Lotus 1-2-3, WordStar, dBaseII, and so on. Not all these will run as true multi-user applications — this will depend on whether they include or can be modified to include 3Com semaphores in the coding, but in many cases this will not be too much of a hardship. Neither will the system run any PC applications which are protected in any way, for example, Prolok.

Typical of the commands which have been added to MS-DOS in this North Star implementation are those that relate to its multi-user orientation and its hard disk basis of working. In everyday use, the average individual user is going to need access to the diskette only rarely, unlike with a standalone machine. All applications programs in common use will be held on the hard disk. Gaining access to the diskette drive is, therefore, a specific task on the Dimension and the DOS provides a couple of ways of achieving this. The first is the command REQUEST, which assigns the diskette drive to the logged-on user making the request. All other users are then barred from it. RELEASE is the command that lets the drive go again. These two are used primarily when a new applications program is to be loaded onto the hard disk by the system manager.

If an application is to be run direct from diskette, DISKBOOT is used which automatically turns that user's workstation into what is, effectively, a single disk drive PC.



Macintosh

Apple's
easy to use
personal computer
system

in
the



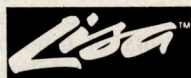
Midlands

phone (0203) 553944
for details of

- Competitive price
- Personal demonstration
- Full support service
- Personal delivery and training service throughout the UK

**Adelphi Business
Computers Ltd**
25 Trinity Street
Coventry CV1 1FJ
Tel: 0203 553944

Also Lisa 2, Apple IIc, Apple III,
Apple IIe



authorised dealer

THE ONLY S100 WORTH NOTING.



Over 100 different S100 cards, crates and systems.

HIGH TECHNOLOGY ELECTRONICS LTD. 303/305 PORTSWOOD ROAD,
SOUTHAMPTON. TEL: 0703 581555 TELEX: 477465 HTELG.



The writing's on the wall...

The introduction of MSX Basic has quite simply revolutionized the use of home computers. From today most of the languages in common use will fade into the brickwork.

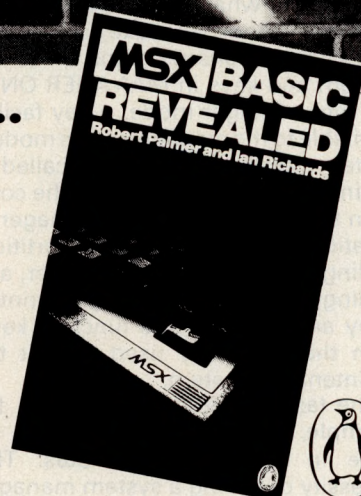
Up until now home computers have used different machine languages, so that games and peripherals have been totally incompatible, but the introduction of MSX Basic will allow all products to run on any of these new machines. The implications are awesome.

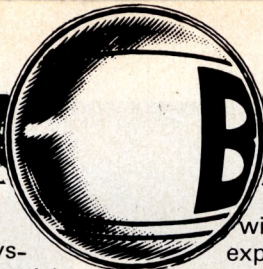
Such a milestone in computer development deserves an equally innovative book. And not surprisingly it's published by Penguin.

MSX BASIC REVEALED gives the reader vital programming skills for MSX, and a detailed examination of its potential uses. It is one of the first books in the field and is certainly the very best.

When you realise that present day language systems have had their chips, you'll realise the need for MSX BASIC REVEALED.

by Robert Palmer and Ian Richards £6.95





BENCHTEST

The system software covers a wide range of systems management tasks which are required to be performed by the system manager. This position will be an appointment from among the users, usually of an individual of suitable status within the user organisation and with sufficient experience to effectively carry out the duties. This should not be taken to mean that a high level of technical competence is required of the system manager, but the tasks are such that some comprehensive experience of using a computer, preferably an IBM PC or clone, will be a useful skill.

The system manager's job involves ensuring that the system runs efficiently, and that the users have sufficient resources for their needs and applications. A major portion of this task is involved with partitioning the available disk space so that every user has what he requires.

The hard disk can be divided up into a maximum of 64 different partitions, each of a minimum 360k capacity. Partition numbers 0 and 63 on the disk are reserved for system software, utilities and electronic mail facilities, and cannot be touched by any user or the system manager. If a second hard disk is installed, its first partition, numbered 64, will also be reserved for these duties.

It is the system manager's task to define the profile of each user, including his own. Each profile will contain details of the partition(s) available to each user name, and the size of each partition. This will be governed by the demands of a specific application, with a user who's doing long textual reports under WordStar requiring more space than someone doing small financial models on a spreadsheet that rarely need to be saved.

Only the system manager can perform such tasks as deleting or adding applications on the public partition and changing the profiles of users on the system; this also includes being able to add or delete users. These facilities are available in what the DOS refers to as 'manager' mode. To make use of them, the system manager signs on to the system and keys in MANAGER ON to get into manager mode. A key facility available to the manager in this mode is system maintenance, which is called up by keying MAINT. This provides the common tasks required of the manager of creating or changing a partition, adding, editing or deleting a user, and adding, editing or deleting a printer. They are called by the function keys, with the tenth key used to exit the maintenance system.

The task of adding a new user, for example, is quite simple and can be done in just a few minutes. The necessity of having a system manager

with at least some computing experience will be high-lighted where disk partitioning work is undertaken. At least a general understanding of the concepts of disk storage and the potential capacity requirements of applications programs is a good thing to have when deciding the required size and type.

The one disadvantage of the Dimension system here is that it has to be effectively closed down to all users if any systems management task is to be performed. Unlike many local area network systems, it isn't possible to perform a task such as adding a new user while the machine is being used by other operators. For any systems management task it's necessary to banish all other users for the duration, which may not always be the most popular thing the manager does.

As the machine has to be laid on its side to gain access, there is a possibility of damage to the hard disk as the flying heads move around. To prevent this, North Star has built in a command to the DOS called DISKLOCK. As its name implies, it locks the head away from the disk. Once instigated the system module is turned off, and the head remains locked until it is freed by power on.

Applications software

Apart from DOS and the system management software, the Dimension does not have any software bundled with the machine but it will run the majority of IBM-compatible/MS-DOS applications. Loading a new application is a straightforward affair performed by the manager. The diskette drive is requested, the application disk is loaded in and the normal application and/or MS-DOS copying conventions are observed to get the application onto the public partition on drive C of the hard disk.

Once the central module is switched on, each user's workstation board is potentially 'live' and ready to run. The user turns on the workstation and sees the sign-on and password entry routines; this will lead into the standard MS-DOS prompt which in this case is the default drive, letter 'C'. Now the user calls up an applications program.

It's here that the power of the machine becomes apparent, especially

if two or more terminals are close together. The Dimension uses a specially written algorithm for searching the hard disk which ensures the minimum number of passes over the disk by the read/write head.

Data from the disk is first read into the cache memory under the control of the 80186 processor, and then fed out to the respective workstations that have requested the data. The algorithm allows the head to collect all requested data as it is passing on the disk, rather than complete one full read task then go back and start another. The respective tasks are assembled in the cache memory.

The practical result of this is speed — even in single-user mode it's fast and can load Lotus 1-2-3 in about one second. WordStar takes around 5.5 seconds (including an intermediate RTRN keystroke on the test machine). There was, however, no discernible loss of loading speed when it was asked to load both onto different workstations simultaneously; both were in and ready to run in 5.5 seconds. The same speed was achieved when simultaneously loading dBaseIII and WordStar. Saving a long document file in WordStar can take noticeable amounts of time on some machines, but is completed rapidly on the Dimension.

Dimension applications programs fall into two basic categories — multi-user and single-user. The type of multi-user program that the Dimension can operate with are those that have, or can be modified to accommodate, the 3Com semaphores. These allow several people to be active within one file at any time while stopping them working on a single record simultaneously.

North Star currently has accounting packages from Sky and Omicron available with the 3Com semaphores, ready for full multi-user applications. The Dataflex database system is also available, with Delta and Datamanager expected soon.

But there are many applications for which the company feels that full multi-user capabilities are not essential and where a single-user application package will suffice. This doesn't mean that there is no means of sharing the data between users, and the solution selected will depend to a large extent on the application. For example, the shared data in a word processing application is often going to be of the standard paragraph type, and these can be held in the public partition as read-only files which can be pulled out as required. The finished document can then be saved to a personal partition.

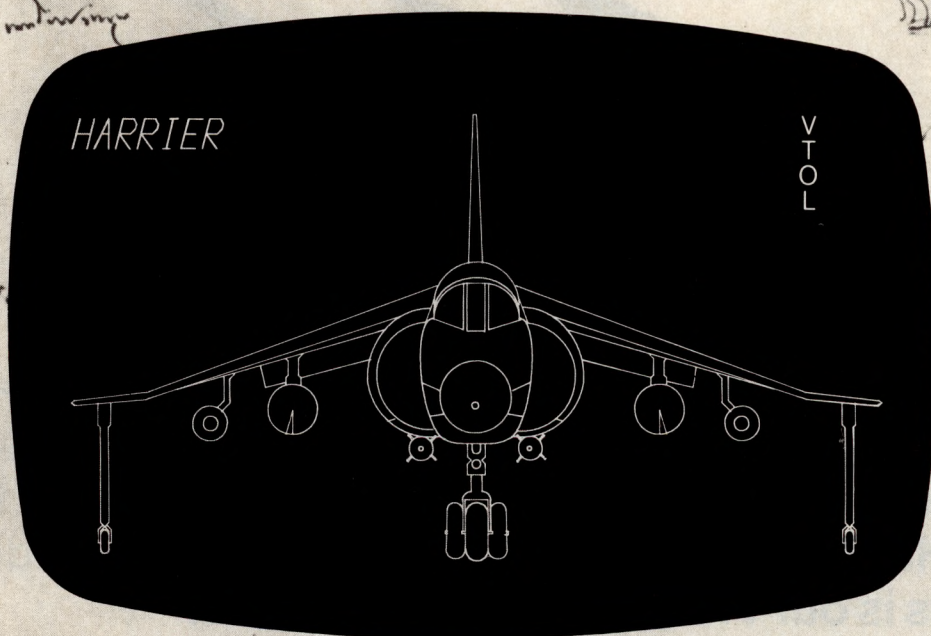
Where there is a need to allow other users access to an individual's files, this can be achieved in one of three different ways. Firstly, the system manager incorporates all personal partitions in

Benchmarks

BM 1	0.8
BM 2	3.1
BM 3	6.6
BM 4	6.8
BM 5	7.4
BM 6	13.1
BM 7	20.2
BM 8	21.6

All timings in seconds. For a full listing of the Benchmark programs, see page 185, January issue.

Drawing and words...



It took the rare skill of Leonardo Da Vinci to conceive of manned flight and to be able to portray his ideas.

Doodle dms gives today's designer the power of micro-computer technology to design, change and draw his ideas.

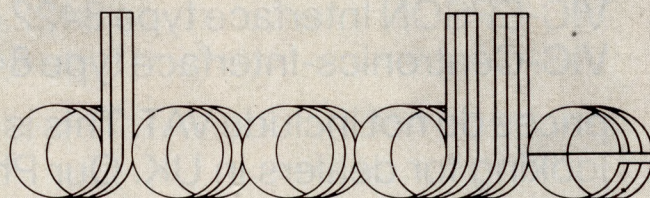
Doodle is a breakthrough in graphics software. Anyone can learn to draw simple line diagrams or sophisticated technical designs with Doodle.

Doodle easily integrates drawings in word-processed text for reports, catalogues or training manuals.

Doodle can produce high quality output on low cost Matrix printers and runs on IBM-PC, Sirius, Apricot, Compaq, Zenith, AM-Stearn, Olivetti M24 and Columbia.

- Engineers, designers and architects can use Doodle for CAD.
- Educators can use Doodle for designing course material.
- Lecturers can use Doodle for creating presentation material.
- Exhibitors can use Doodle for creating dynamic displays.
- Office Managers can use Doodle to plan layouts or design forms.

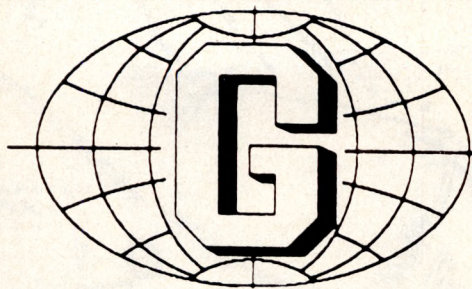
How could you use Doodle?



The Electronic Pencil

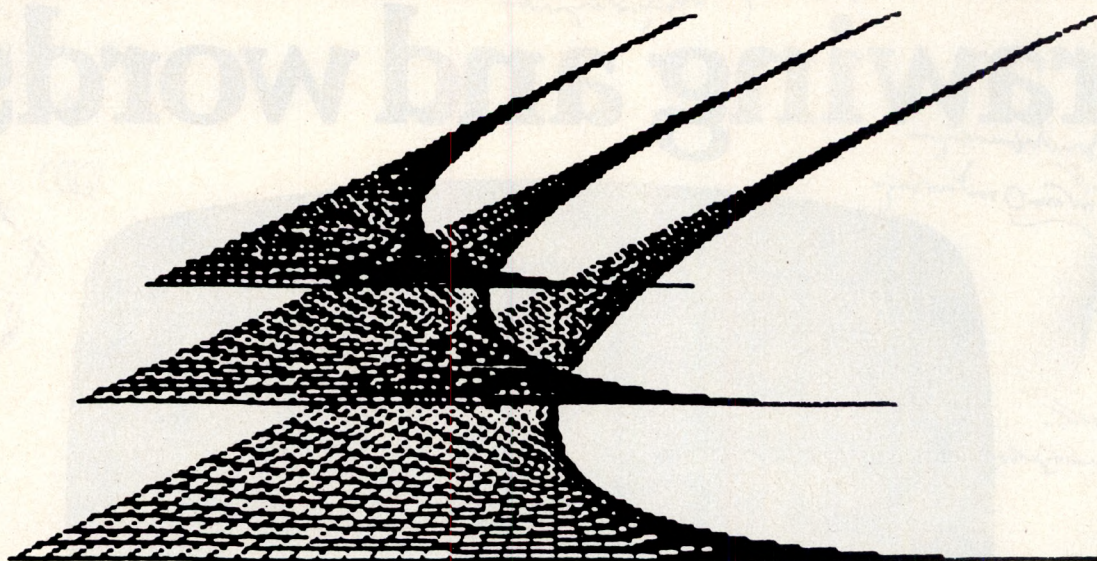
Further Information from:
Trilex International Marketing Limited,
57 Church Street,
Staines, Middlesex TW18 4XS
Telephone: Staines 63771

**DEALER ENQUIRIES
WELCOME**



GÖRLITZ COMPUTERBAU

MUCH MORE ON YOUR SIXTY-FOUR



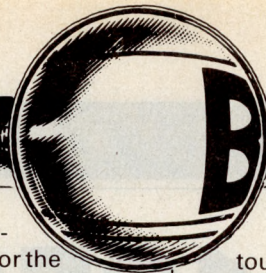
Print your heart out using EPSON printers and GÖRLITZ interfaces – over 10.000 sold in West Germany. Definitely THE BEST connection between VIC-64 and EPSON printers is our VIC-EPSON-INTERFACE:

Plugs right into any EPSON (board 8422) * 2K Buffer (8K option) * Z80 processor * lots of additional control functions * brings you the original CBM character set with all graphics in up to 40 sizes * including double height and double width printing of CBM characters * precise HARDCOPY from SIMON's BASIC * BUS connector doubled like 1541 * DIL-switch for device address * printer remains unchanged * Interface can be switched off if Centronics port is used * No. 8423 for external use with EPSON-compatible printers like STAR etc. * Prices include DIN cable (im) and manual.

VIC-EPSON Interface type 8422 (board)	£ 68.50
VIC-Centronics-Interface type 8423 (external)	£ 69.50

prices do not include VAT. This is just one GÖRLITZ product. We are looking for dealers in UK. Our Phone: (01049)-261-27500. Mailbox for letters, queries and orders starting October: (01049)-261-2044.

GÖRLITZ COMPUTERBAU * P.O.BOX 852 * D-5400 KOBLENZ, WEST GERMANY



their own manager's partition. It is then possible for the manager, when signed on as such, to copy the file from one user's partition to another and then sign off again.

The second approach depends on the creation of a shared partition between the users needing to swap files. This shared partition will also be assigned a different user name that is used as a sign-on when copying from one user to the other.

The third technique is to simply REQUEST the diskette drive, copy the file to the diskette, and then RELEASE the drive. The recipient then repeats the process and copies from the diskette to a personal partition.

It would be unfair to the machine to describe its facilities and applications without mentioning its electronic mail capability.

It's possible to send mail to any user from any terminal by keying in MAIL in response to the prompt. This sends the machine into a routine which displays a neat screen format in which the user can write and address messages, or read the messages that have been received. If there is mail for a user who is not logged on, the message 'You have mail waiting' will appear under the prompt when he signs on next time. It's a neat and simple electronic mail system entirely controlled by the func-

tion keys and adds a rounding touch to the overall package.

Documentation

There are four manuals in the complete documentation set for the Dimension, although most users will probably only see one. This is the *User's Guide*, which is a simple, step-by-step guide to the workstation and shows how the facilities which an individual user has access to can be utilised. It is essentially of the 'how to sign on and call up an application program' type and does its job very well.

The second and third manuals are more serious, and more comprehensive; both are intended for the system manager. One is the *DOS Manual*, which is largely the same as the Microsoft equivalent but with coverage of the extensions. The other is the *System Manual*, which sets out all the facilities available to the system manager for creating profiles, partitions and general system maintenance. The fourth manual is the *Technical Manual* and is unlikely to appear outside the dealer's door.

All are well written and are presented in hard-bound ring binders; this allows updates to the manuals to be incorporated as they occur. The one drawback of not having bundled software is that users can end up with different styles

and sizes of documentation for their system: it would be nice if some coherence could be brought to bear here.

Prices

The pricing of the Dimension has been set quite competitively by North Star, given the market-place at which it is aiming the machine. The minimum configuration available, and incidentally the configuration which was supplied for this review, consists of a central module with 256k of memory and a 15Mbyte hard disk, plus two workstations with 128k bytes each. This package, which includes the North Star DOS, costs £5875.

Although this is more expensive than the average desktop standalone machine by a reasonable margin, it is in fact competitive with two IBM PC/XTs (North Star claims you get at least the equivalent performance of two XT's). Additional workstations which come complete with keyboard, display, 25ft connector cable and processor board cost £1395 each.

The 256k RAM expansion board for the central module costs £690, while the two available for workstations, the 128k and 384k boards, are £385 and £845 respectively.

As a guide to its competitiveness, North Star claims that an average installation of five workstations and a central module will cost 40 per cent less than four IBM PCs and a PC/XT networked together.

Conclusion

The success or failure of the Dimension will, in the end analysis, have little to do with the machine itself. Instead it will be the way and speed with which users in small to medium sized companies take up the idea of a small, competitively priced multi-user machine, and, more importantly, it will depend on IBM.

The arrival of the PC/AT as a potential multi-user engine shows that IBM is aware of the potential of such a market-place and to exploit it, the company will have to maintain some degree of compatibility with the vast base of applications software which already exists. This means that the Dimension is in the right position to reap some of the rewards.

It is a soundly engineered machine that is fast, efficient and tolerably viceless — certainly viceless when not trying to perform tasks like running protected programs that the machine is not designed to run.

If it suffers from any major drawback, it's the temporary lack of available multi-user software with good record locking — this will hinder its market penetration.

Technical specifications

Central Module

Processor: 6MHz 80186
RAM: 256k
Mass storage: 15 or 30Mbyte hard disk, 360k 5¼in floppy disk
Size: 20 × 12 × 24in
Weight: 60lbs
I/O: One × RS232, one programmable serial, one Centronics parallel
DOS: North Star DOS version 1.1.0

Workstation

Processor: 7MHz 8088-2
RAM: 128k
Keyboard: 84-key, IBM-compatible layout

In perspective

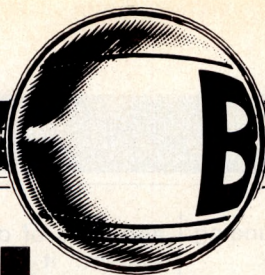
The whole area of small multi-user machines is just beginning to open up, so the Dimension comes at an interesting time. There seem to be two schools of thought about how to approach the demands of the small to medium, five to 50-employee companies. One is the supermicro which normally runs a Unix-alike operating system and costs around £10,000 for a start-up system; the new alternative is a machine like the Dimension.

Its key advantage is the choice of MS-DOS as the basis of its operating system, which gives it a wide range of available applications software that most users will be familiar with. These will, however, mainly be single-user applications that could frustrate some users.

The market is one that IBM has recognised with the launch of the PC/AT, so there should be pickings enough for North Star. This will be so as long as it is not superseded by any developments which may occur on the IBM operating systems front over the coming year.

For anyone looking for a multi-user machine that can run up to 12 workstations using familiar applications programs, the Dimension is certainly one to consider seriously.

END



Sharp PC-1350 VS Casio FX-820P

What is the ideal niche for a pocket computer — as an on-site boon to field executives, as an introduction to computing, or is it just an impressive calculator? Nick Walker looks at the Sharp PC-1350 and the Casio FX-820P, two diminutive contenders in the lap-held/portable revolution.

With the growing interest in lap-held computers, it seems that an often-forgotten corner of the computer market is that of pocket computers. This is a shame as these machines probably offer a great amount of computing power within the smallest amount of space, providing you can accept the diminutive keyboard and display.

Unlike lap-helds, which are scaled-down versions of business machines, pocket computers are much older and grew out of the programmable calculator market. Originally the battle for the title of programmable calculator king was between Texas Instruments (TI), Hewlett-Packard (HP) and Casio. Then in 1979 Sharp launched the PC-1211, the first hand-held with Basic, and since then it's been Sharp versus Casio with HP and TI staying in the scientific/programmable calculator field. Both Sharp and Casio have continued to develop in this field and it's two of the latest machines from these companies that are reviewed here — the Sharp PC-1350 and the Casio FX-820P. Notable predecessors were the FX-702P, Casio's answer to the PC-1211, and the PC-1500 from Sharp with its comprehensive Basic, graphics and a remarkable printer/plotter.

Sharp PC-1350

Hardware

The PC-1350 pocket computer is enclosed in the now traditional brushed aluminium ABS case. The machine is considerably smaller than the PC-1500A and more in line with the dimensions of the original PC-1211 —

very slim and suitable for, say, an inside jacket pocket. The small size is due to Sharp reverting back to the button-sized lithium battery as a power source. These give approximately 250 hours of life to the machine, and an alternative power source is available.

On the back of the machine is a removable aluminium panel, under which is the edge connector for insertion of the optional 8k and 16k RAM cards. Also under this panel is a small

... it's surprising what applications software is available for pocket machines, and ... most of it will be converted to the PC-1350. Typically there is scheduling, tiny databases, sales analysis and other packages ...

sliding door to the battery compartment.

Pocket computers are not designed to be looked at internally, and I was soon frightened off by the vast number of tiny screws and delicate construction. However, within these tightly packed PCBs I am assured there is an 8-bit processor of Sharp's own design, a 40k ROM, 5k RAM and all the other necessities that make a computer. All the chips are CMOS, allowing memory to be retained even when the machine is switched off.

The keyboard consists of a non-

staggered qwerty layout of calculator keys, very similar to the PC-1211, with a larger numeric keypad and control keys to the right. The alphabetic keys are just about fingertip size and it's all too easy to hit up to three keys simultaneously; probably the simplest way round this is to use the blunt end of a pen instead.

The nicest feature of this machine and the reason that the keyboard is so small is the LCD display. Rather than the usual one-line arrangement, this is a four-line by 24-character display, or 32 by 150 pixels if used graphically. Left of the main display but still within it are annunciators for programming mode, lower-case and definable mode.

Other notable hardware features include a contrast thumb wheel (at last). A well documented serial I/O port, which includes configurable baud rate and parity is on the right-hand side — quite remarkable for a pocket machine.

Software

Most pocket computers, as a result of their calculator origins, can be used as a calculator. The PC-1350 is no exception: it acts as a very powerful scientific calculator, especially as variables can be used within manual calculations. Calculation is performed to 10 figures with a dynamic range of 10. A wide range of scientific functions are provided, although these are perhaps a little more cumbersome than their calculator equivalents as they have to be spelled out. The machine breaks no records in terms of speed, and is probably on a par with the slowest of the home machines.

The PC-1350 has three modes of operation: run, program and reserve



mode. Run and program are toggled by the mode key in the upper right-hand corner of the machine; run mode allows program execution and the use of the machine as a calculator; and program mode is for program entry and editing. Reserve mode is entered by typing SHIFT MODE and allows the bottom two rows of qwerty keys to have a string associated with them. These can then be recalled in both program and run mode, and are useful for commonly used Basic commands and functions.

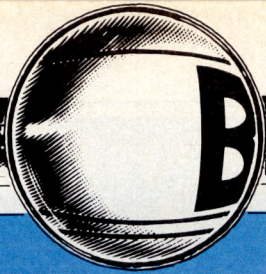
The bottom two rows of qwerty keys can also be used in conjunction with a

DEF key to run a program, or section of program, whose Basic line is labelled with the corresponding letter. The editor can be described as a full-screen editor even though the screen is only four lines long with four-way movement scrolling when necessary, and insertion and deletion control by four cursor keys.

The Basic interpreter is held within an extremely large (for a pocket machine) 40k of ROM, and is Microsoft based with extra commands for graphics, the I/O port, and so on, which adds up to around 120 commands. Unlike some of

the previous pocket machines there are no noticeable omissions in the Basic: string handling, one or two dimensional arrays and data statements are all there in their standard Basic form. Variable names can be of any length with the first two characters significant.

The PRINT command stops execution of a program so that the information is not scrolled off the screen, and there's a PAUSE command which enables display for a programmable length of time. Debugging is facilitated by the commands TRON and TROFF, which display line numbers and allow



BENCHTEST



The Sharp PC-1350 in use; the Casio FX-820P sitting on its disk interface

single stepping.

Cassette file-handling instructions are included for use with the cassette interface and a suitable recorder. As well as program saving and loading, there are the necessary INPUT# and PRINT# for data files. The serial I/O port can also be accessed from Basic with such commands as OPEN, CLOSE and CONSOLE, which is a sure sign that Sharp intends the machine to be used on site and brought back to base to communicate with a larger machine.

The area where the Sharp really shines out from the competition is in the graphics commands which drive the 32 by 150-pixel screen. Text and numerical

data can be displayed anywhere onscreen so that a number of running totals can be displayed at once and figures can be labelled. In addition, the display can drive on a pixel basis with point setting and line drawing commands. Small histograms and line graphs can be drawn with this facility, and it's also used in games.

Overall I was very impressed with the Basic although a little surprised that it took 40k of ROM to implement it. The only thing I can find to complain about is the absence of a real-time clock, something which is useful on portable machines that are used for appointment keeping and is found on the

PC-1500. The absence of a block delete and renumber routines is also a disappointment.

After some searching it's surprising what applications software is available for pocket machines, and I suspect that most of it will be converted to the PC-1350. Typically, there is scheduling, tiny databases, sales analysis and other packages for people who need computing power outside the office.

Documentation

It seems that for Sharp the writing of quality documentation is an uphill battle. The earliest attempts at providing a tutorial for the MZ-80K and the

PROGRAMMERS! amateur or professional WE NEED YOUR TALENTS

MIRRORSOFT, the home computer software publishing division of Mirror Group Newspapers is always on the lookout for exceptional, original, machine code games for 48K ZX Spectrum, Commodore 64, Amstrad CPC 464 or MSX computers.

If your games measure up to the best around we should be talking.

We pay competitive royalties and we're sure you will find *our* offer attractive.

You will be dealing with the company whose publications include the Daily Mirror, Sunday Mirror and Sunday People – newspapers which are read by over half of the adults in the country – so the support behind your product would be enormous.

Write to Steve Mercer and tell him what *you* have to offer or phone him on 01-822 3580.



Mirror Group Newspapers Ltd., Holborn Circus, London EC1P 1DQ.

PRODUCTION CONTROL ON A MICRO?

Yes, the benefits of computing are now available to all manufacturing companies, however large or small.

With an entry cost of as little as £200, our software is low on cost but not on benefits.

Our software gives help where it is often needed the most — to the people who service and supervise production.

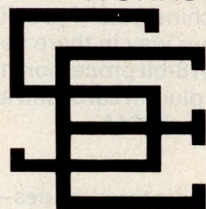
Modules available now include:

ENGINEERING DATA BASE

PRODUCT COSTING

STOCK RECORDS

WORKS ORDER PROCESSING



COMPUTER SOFTWARE
from
SOFT ENCOUNTERS LTD.

Tel. (0506)-847514

5 Pilgrims Hill, Linlithgow, W. Lothian

INTERFACE

Network PLC

The Computer Professionals

When you decide to trust a computer with your business, it's the start of a long-term relationship.

Every Interface Computer Business Centre is dedicated to supporting that relationship. Although many people sell computers, few actually **support** their customers with so much care.

If you are new to computers, we have special courses to guide you. We train your staff. We develop and update your software. Our engineers are always available.

When you want to talk business computers – come to the professionals.

Interface Business Centres

London: West End – 18a/20 Baker St., London, W1

01-486 9121

City – 289/293 High Holborn, London,

WC1 01-404 4667

Kingston – 66 High St., Kingston, Surrey

01-541 1055

Also at Basingstoke, Belfast and Manchester.

badly translated PC-1211 manual undoubtedly prove this. But happily, by staying mainly as a reference manual, the PC-1350's 269-page instruction manual is quite comprehensible. By far the worst chapter is the one that tries to teach Basic programming; I recommend that this is replaced by a standard Basic programming book.

Interestingly, with the PC-1500 there were three commands — PEEK, POKE and CALL — that were undocumented. On the PC-1350 these commands are once again available, and are mentioned in the manual for a self-test routine but are not explained anywhere else.

I don't know what Sharp has against people looking around the memory of its machines — perhaps the fact that we might find out exactly why it took 40k of ROM to program the Basic.

Casio FX-820P

Hardware

The Casio FX-820P is a larger machine than the Sharp PC-1350, and is once again covered by a brushed aluminium ABS case. It is powered by two lithium batteries which keep the machine alive and kicking for approximately 140 hours. The batteries are replaced by removing the back panel; this requires the removal of two tiny Philips screws for which you really need a suitable jeweller's screwdriver.

The reason for the extra bulk is the inclusion of a built-in printer to the left of the machine, and the NiCad batteries to drive it. The printer uses special



RAM cards are available for both the Sharp and Casio machines

electrothermal paper of tally roll size, and produces a good quality print after it's printed the first four lines or so. A charger unit is supplied with the computer for recharging the NiCads, and when fully charged they should work for well over 3000 lines of printing.

Although the increased bulk is a result of the inclusion of a printer, by far the worse casualty is the LCD display. This is a tiny one-line, 12-character affair to the right of the printer and can only be described as just about workable.

On the front of the machine is an opening for the insertion of either 2k or 4k RAM cards (one 2k card is supplied

with the machine). These cards contain a tiny battery that maintains memory contents even when the card is removed. As a result, Casio eagerly pursued the idea that they could be used in a similar manner to floppy disks, with frequently used data and programs stored on a number of RAM cards. This is very nice, but at £20 a time for only 2k of storage it's rather expensive.

The Casio's keyboard is a staggered qwerty arrangement of calculator keys with a proportioned space bar. There is sufficient room for most fingertips, and it all works very effectively as well as making the machine look neat. To the right of the keyboard is a numeric keypad, and the top row of keys spanning both keypad and qwerty pad are control keys.

To the left of the machine is a thumb wheel for adjusting the contrast, and to the back is the edge connector for connection to the optional cassette interface. There's also an all-reset switch on the back which is activated by a pen nib: this clears all data and program memory, and restarts the machine. The FX-820P is slightly faster than the Sharp PC-1350, but once again won't set any records for speed of operation.

Casio is as shy as Sharp about people getting into its machines, but if you did manage to hack your way in there you would find a custom 8-bit processor, no RAM (it's all on the plug-in card) and an undisclosed amount of ROM.

Software

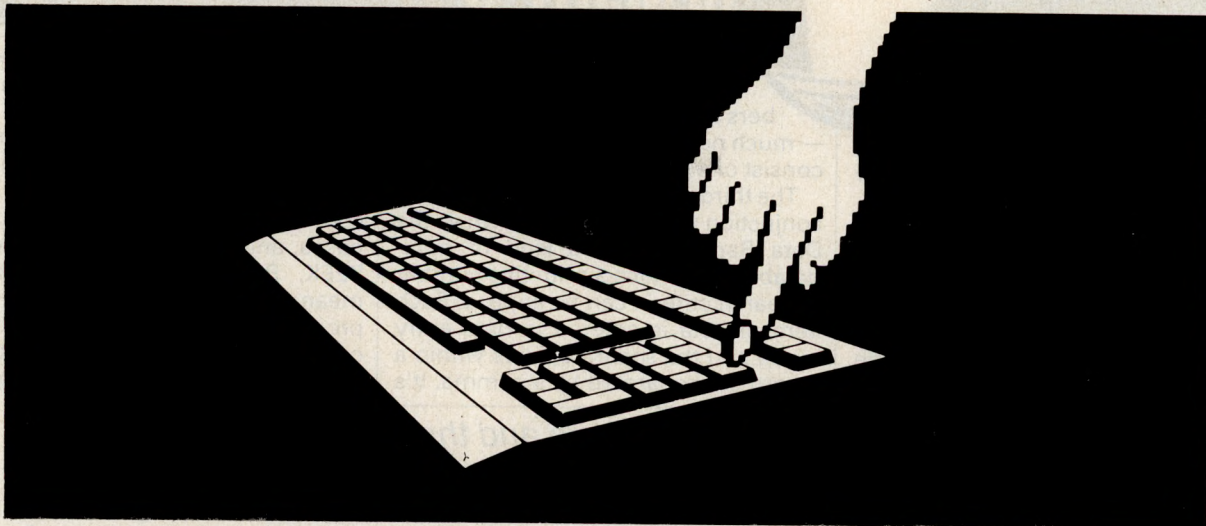
The FX-820P operates in three modes — run, program and Data Bank entry — each of which is accessed by pressing the MODE key followed by a numeral. Other combinations of MODE and numerals change the angular mode

Technical specifications FX-820P

Processor:	Custom CMOS design
RAM:	2k with included RC2 RAM card, 4k with optional RC4 RAM card
ROM:	Amount not stated but incorporates OS, Basic and Data Bank
Mass storage:	Cassette tape with cassette interface, battery-backed interchangeable RAM cards
Keyboard:	56 calculator keys in staggered qwerty arrangement
Size:	172 × 96 × 34mm
Weight:	0.41lbs
I/O:	Cassette port for cassette interface
Peripherals:	Cassette interface, 2k RAM card and 4k RAM card

Technical specifications Sharp PC-1350

Processor:	8-bit custom CMOS chip
RAM:	5k, additional 8k and 16k cards available
Mass storage:	Tape using cassette interface, battery-backed interchangeable RAM cards
Keyboard:	62 calculator keys in unstaggered qwerty arrangement, plus numeric keypad
Size:	182 × 72 × 17mm
Weight:	0.42lbs
I/O:	Custom serial I/O, optional RS232 step up/down
Peripherals:	CE126P printer cassette interface, CE152 cassette recorder, 8k and 16k RAM cards, RS232 step up/down transformer



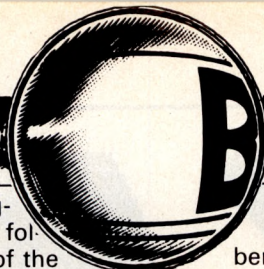
**Important
New for**



SANYO

**micro
owners!**

- ★ The SMUA has been formed to support *you* and your computer.
- ★ Our services include unlimited telephone support for the software supplied with your Sanyo Micro.
- ★ For further details dial 100 and ask for
FREEPHONE SMUA



BENCHTEST

and setting of the debugging options. Casio has followed in the footsteps of the Sinclair Spectrum by assigning as many as five different functions to one key. Various combinations of shift, function and extended mode are needed to access these, but as with Sinclair a colour scheme eases your way around.

From run mode the machine can be used as a scientific calculator; the one-keystroke entry of functions works very well here alongside the use of variables in immediate calculations. A fine array of functions exist, making the machine an excellent proposition for anyone who would normally consider a top-end programmable scientific calculator.

Also from run mode it's possible to run any one of the 10 programs that can be in memory simultaneously.

Program mode is for insertion of a Basic program. As stated, up to 10 separate programs can exist in memory at the same time, all taking from a central pool of memory. While entering a program, a second, small four-digit display is shown above the main one indicating the amount of program steps remaining.

Like the Sharp, the Basic is very comprehensive by pocket computer standards but no real features shine out as particularly interesting.

An optional cassette interface allows programs and data to be stored on tape, and also the data file-handling capabilities.

ties. A trace option is available which displays line numbers and facilitates single stepping — much needed as the error messages consist of a grand total of eight.

The third mode, data entry, is used in conjunction with a feature known as the Data Bank. This is a kind of mini-database on which a primitive number of search criteria can be applied. Each item of data is entered in data entry mode and the separate fields within a record are separated by a comma. It's

'Both the Sharp and the Casio have features in their favour, but overall I'd plump for the Sharp with its 40k Basic and graphic display. However, if a hard copy of calculations is important then the Casio is the neatest . . .'

then possible to do a sequential search through the data, or search via a specified string through any field. Used alone this would allow you to store, say, a number of telephone numbers and perform an intelligent search on either name or number.

The real power of this feature is revealed when it is used in conjunction with a Basic program. The Data Bank

can be accessed as a random access file allowing complex search criteria to be constructed from the program.

There seems to be less commercial software available for the Casio than for the Sharp; what does exist once again consists of scheduling programs, databases, and so on. The absence of the PEEK, POKE and CALL commands means that it isn't possible to write programs with a machine code content or directly access the ROM — two things necessary to produce good quality commercial software.

Documentation

Two books are included with the Casio FX-820P: a 200-page *Owner's Reference Manual* and a 94-page *Database Reference Manual*. These are generally well written but do show signs of translation, the most amusing being that the manual constantly refers to the machine as the 'mainframe'. In particular, the phrases that try to make the manual friendly suffer in translation. For example: 'However, unless you activate the computer function you cannot use it.'

Prices

The Sharp PC-1350 retails for £129 with 5k of RAM built in. Additional RAM cards cost £69.95 for an 8k RAM card, and £114.95 for a 16k RAM card. The printer/cassette interface costs £59.95 and the matching audio cassette recorder £39.95, but any cassette recorder with the right sockets will do.

The Casio FX-820P is the top of a range which all feature the Data Bank and are priced as follows: £89.95 for the FX-820P; £49.95 for the FX-720P (same as the FX-820 but without printer); and £49.95 and £39.95 for the lesser PB-410 and PB-110 respectively. Peripherals are £22.95 for the cassette interface, £29.95 for the character printer, £19.95 for the 2k RAM card and £29.95 for the 4k RAM card.

Conclusion

Pocket computers are still a viable proposition for engineers, field service personnel and anyone who needs computing power but is not too concerned about full keyboards and screens. The other market that both Casio and Sharp obviously consider important is as an introduction to computers. Both machines fill that roll very well and would probably still be useful after you'd been introduced, unlike a cheap home machine. What's more, they look rather more impressive than does a Sinclair ZX81 or Spectrum.

Both the Sharp and the Casio have features in their favour, but overall I'd plump for the Sharp with its 40k Basic and graphic display. However, if a hard copy of calculations is important then the Casio is the neatest portable method of doing this.

END

Benchmarks Casio FX-820P

BM1	10.8
BM2	48.9
BM3	106.8
BM4	95.5
BM5	126.1
BM6	200.6
BM7	251.7
Ave	120.0

All timings in seconds. For a full listing of the Benchmark programs, see page 185, January issue.

Benchmarks Sharp PC-1350

BM1	7.3
BM2	47.7
BM3	110.1
BM4	113.3
BM5	127.6
BM6	180.2
BM7	294.3
Ave	125.8

All timings in seconds. For a full listing of the Benchmark programs, see page 185, January issue.

In perspective

If you decide that a pocket computer is what you want, the market is unfortunately very limited and consists purely of Sharp and Casio models. Both the Sharp PC-1350 and the Casio FX-820P are top-of-the-range machines, with the lesser models being progressively cheaper as features are stripped off them. If complex calculations are your only requirement it may be worth looking at a programmable calculator such as the Hewlett-Packard 41C or Texas Instruments 60, both highly scientific but not programmable in Basic.

If you're considering a pocket machine as an introduction to computers, then it's worth looking at the home computers available. In terms of computing power there's no doubt that you could purchase more for the same price with a home computer, but you would lose the portability. If nothing else, a pocket computer must be the most impressive way of adding the shopping bill on the weekly dash around Sainsbury's.

For under £200 you can become your brother's keeper

In just a few days you could be using this amazing, new printer from Brother. It's small and neat but packed with more than its fair share of features.

TRAVELS AT A STEADY FIFTY

In the speed stakes, the M-1009 is certainly no slouch, being fully capable of up to 50 characters per second.

The M-1009 has bi-directional and logic seeking printing for normal characters and uni-directional printing for super script, sub script and graphics.

PRINTS ON ANY PAPER

Being an impact printer, the M-1009 will print on virtually any paper, including letter headings, invoices and standard office stationery.

It will even print two copies together with your original.

A GREAT CHARACTER REFERENCE

No less than 96 ASCII plus international type and graphic characters are standard.

BIG BROTHER RELIABILITY

Built to the same exacting standards as Brother's elite office printers, the Brother M-1009 already has faultless credentials for reliability.

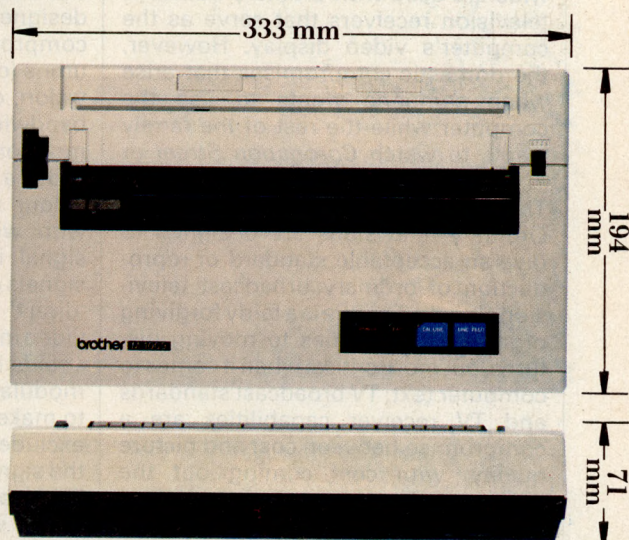
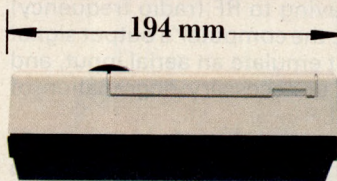
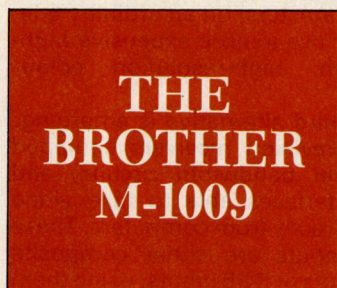
It's 9x9 dot matrix head, for example, has an astonishing 20 million character service life.

SUITABLE FOR ANY MACHINE

With IBM Centronic and the Epson dual serial/centronic interfaces fitted as standard the M-1009 is suitable for any home or business computer.



With
Tractor Feed



FULLY GUARANTEED 7 DAY DELIVERY

You can order in confidence, your Brother printer will arrive by courier within 7 days of your order complete with manual and full guarantee.

£199.95

NO MORE TO PAY!

Order your Brother M-1009 now! Access/Visa holders ring 01-482 1711 or fill in the coupon below, or write to:

**RELATIVE MARKETING,
UNICOM HOUSE,
182 ROYAL COLLEGE STREET,
LONDON NW1 9NN.**

(Personal callers welcome Monday-Friday 9-6, Sundays 10-1).



TO: RELATIVE MARKETING, UNICOM HOUSE, 182 ROYAL COLLEGE STREET, LONDON NW1 9NN.

Please send me by courier _____ (qty) Brother M-1009 printer(s) _____ (qty) Tractor Feed unit(s) at £17.25 (inc VAT). _____ (qty.) Printer Cables at £9.95 (inc VAT). State make and model _____

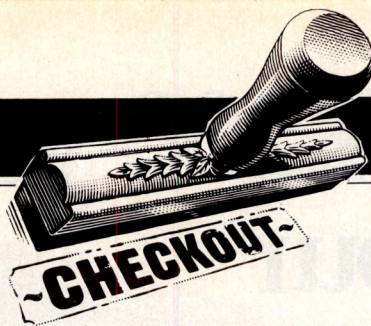
I enclose a cheque for £ _____ or debit my Access/Visa card no _____

Name _____ Signature _____

Address _____

Postcode _____ Telephone _____

PCW3



RGB monitors

Gareth Jefferson looks at the pitfalls that await the unwary when hooking up a computer to a display unit, and considers three new televisions-cum-monitors.

The vast majority of computers worldwide are used with ordinary domestic television receivers that serve as the computer's video display. However, the domestic compromises that arise when someone wants to use the computer while the rest of the family wants to watch *Coronation Street* or *The A Team* is only part of the problem. There are technical compromises too. Ordinary televisions are designed to give an acceptable standard of reproduction of ordinary broadcast television signals. The eye is a fairly forgiving organ when it comes to moving pictures, but more critical when it comes to computer text. TV broadcast standards and TV receiver capabilities are a compromise between cost and picture quality, with cost coming out the winner, and most sets are simply not capable of adequately displaying 80 characters on a line.

Computers, on the other hand, make severe demands of their display units. The signal bandwidth required to display 80 characters across the width of a

screen is more than ordinary televisions can manage, so home computer designers and users are forced to compromise: either display 40 columns (characters) on an ordinary television, or use a more expensive high-bandwidth, high-resolution colour monitor.

But a third alternative is emerging: colour television receivers equipped with wider bandwidth circuitry and signal interfaces able to take video signals directly from computers. These 'direct' inputs are either composite video inputs or RGB inputs; using them avoids having to RF (radio frequency) modulate the computer's output signal to make it emulate an aerial input, and excludes unnecessary degradation of the signal.

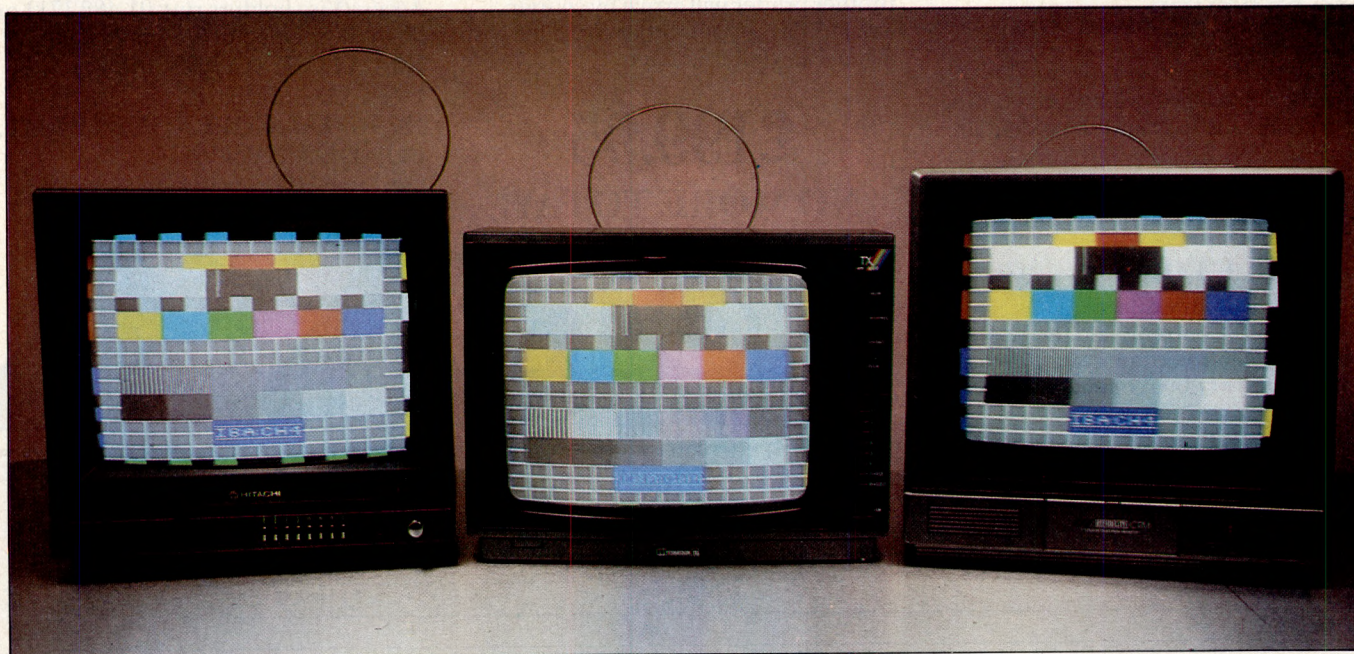
TV receivers and broadcast standards

The signal emerging from a monochrome television camera consists of an analogue video signal (corresponding to the intensity of the illumination of the picture tube as it is scanned), and horizontal and vertical

synchronisation pulses. These sync pulses allow the receiving equipment to know when the end of each horizontal line and each picture field have been reached.

Colour cameras are essentially three monochrome cameras in one, with a separate video output for each of the primary colours — red, green and blue — plus horizontal and vertical sync signals for a total of five signals. These are usually called R, G, B, H-sync and V-sync. The standard signal level for video is one volt peak-to-peak.

Composite video For broadcast purposes, these five separate signals are usually combined into a single video signal called composite video. Although the five original signals are mixed, receiving equipment can separate them using moderately straightforward circuitry. The sync pulses are easily separated from the composite signal using simple time-constant circuits. Composite video signals have the advantage that only a single coaxial cable is needed to connect video



The Hitachi, Ferguson and Fidelity sets can act as televisions (note the portable TV aerials) . . .

equipment, and all the sorting into luminance, chrominance and sync signals can be left to the last unit in the chain — the receiver.

RF signals Although composite video signals involve relatively high frequencies, they are not suitable for radio transmission as such. For this purpose they must first be RF (radio frequency) modulated for transmission at VHF (very high frequency) or, more commonly, UHF (ultra high frequency). So, it's an RF modulated composite video signal that is picked up by a TV aerial and fed into the aerial socket at the back of the colour television receiver.

Since the most common type of input signal in the domestic environment is from an ordinary aerial, most domestic sets are equipped with only a single RF (aerial) input socket. A tuner inside the TV set selects only the required signal (each channel is broadcast on a different frequency), and this RF modulated signal is then demodulated to get back to the equivalent of an ordinary composite signal.

TVs with video inputs The advent of the VCR (video cassette recorder) and, to a lesser extent, the video disc player, has changed the picture slightly. Since there's no need for radio transmission between the video recorder under the television and the TV set itself, most VCRs and video disc players provide two outputs: an RF modulated output and a composite or 'video' output.

Computer outputs Computers that are capable of generating colour outputs invariably do so by generating three separate colour signals (red, green and blue) as well as horizontal and vertical sync. There are three ways of getting this stream of colour data from the computer to a suitable monitor. One is to leave the R, G, B and sync signals as they are and send them individually to the monitor. This involves minimal degradation to the signal, but requires

the use of a monitor able to accept these separate signals.

The second approach is to combine the R, G, B and sync signals into a single composite signal, and here a monitor or television receiver able to accept a composite input is necessary. As mentioned, many ordinary TV sets are now able to do this. Signal degradation is greater than when the signals are left separate, but not as great as when RF modulation is involved.

The third approach is first to combine the separate signals internally, then to RF modulate them so that they emulate a broadcast television signal and feed them directly into the aerial socket of the TV set. All ordinary televisions have this type of input. This method involves the greatest loss of quality, and the screen resolution is generally limited to displaying only 40 characters across the screen or the equivalent in computer graphics.

RGB televisions A few years ago Sony perceived a niche in the consumer video entertainment market for a 'unit audio' approach to domestic television, and produced the Profeel line of TV monitors with RGB inputs and separate TV tuners. Sony was quickly followed by a number of other manufacturers who also offer a unit video approach. The most basic unit is nothing more than a colour CRT (cathode ray tube) with the internal circuitry needed to process separate RGB and sync signals. Other sets offer RGB input and built-in TV tuners to enable broadcasts to be received off-air.

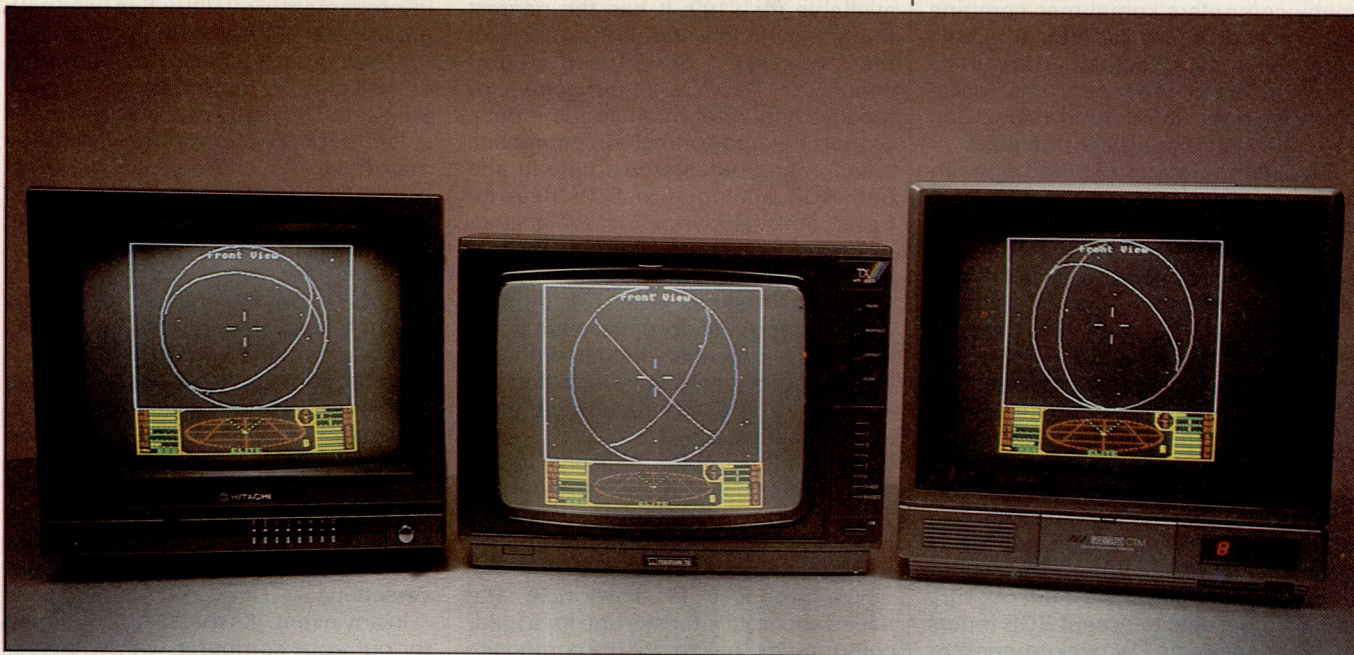
RGB: TTL and analogue If you have a computer with an RGB output, you have the choice of either a dedicated computer colour monitor such as the Microvitec Cub, or a television set with an RGB interface such as the three models reviewed in this article. Whether or not this apparent choice is real depends on the type of RGB output

your computer provides.

The reason for this unfortunate source of confusion stems from the fundamental difference between computer-generated video and 'television' or picture quality video. A colour television receiver, as well as colour computer monitors, provides a large number of phosphor triplets consisting of a triad of phosphor dots, each of which produces either red, green or blue light when irradiated with an electron beam from the electron gun(s) of the CRT. 'Real' pictures have varying degrees of brightness at any given point, as well as colour content. To get the full effect of an ordinary colour picture on a colour set, this involves allowing each of the dots in every phosphor triplet to give out varying amounts of light, from no output to full output. An ordinary colour video signal does this by having two components: luminance (brightness) and chrominance (colour value).

Computers work in binary states of on or off. Computer interfaces use TTL (transistor-transistor logic) chips that produce outputs of (approximately) five volts or zero volts. This binary option means that any of the red, green or blue dots can be fully on or fully off. This limits the choice of displayable colours to eight: red (red only), green (green only), blue (blue only), yellow (red + green), magenta (red + blue), cyan (green + blue), white (red + green + blue) or black (nothing). No other colours are displayable.

There are two ways round this problem: either the red, green and blue signals can be made to vary between fully off and fully on; or a separate intensity signal can be supplied. When the R, G and B signals are at TTL levels, there is no question of varying the signal strength because TTL signals are either on or off — there are no intermediate states.



... or they can act as monitors by bypassing TV demodulation

Broadcast standard colour monitors with RGB inputs have traditionally taken a different approach. They have what is known as analogue RGB inputs. An analogue input is, by definition, infinitely variable between its minimal and maximal values. Video signals are traditionally 1V peak-to-peak, so an analogue RGB signal will vary in intensity between 0V (fully off) to 1V (fully on) and anywhere inbetween. TV monitors for unit video systems, such as the Sony Profeel and the models reviewed here, therefore have RGB inputs that accept analogue signals of between zero and one volts.

Now consider the situation that applies if the R, G and B signals are either on or off, with no intermediate states. The possible signal states and resulting colours are summarised in Fig 1. Only eight colours are possible; this may be fine for computer text and bar graphs, but is unacceptable for television pictures. It's also unacceptable for the home computers that are able to produce 16 or more colours.

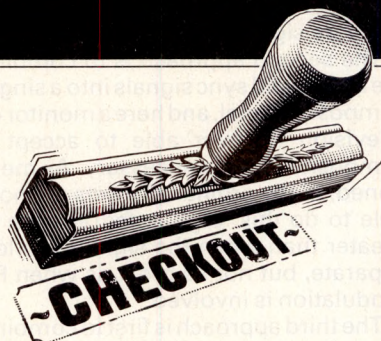
Signal			Resulting colour
R	G	B	
0	0	0	Black
0	0	1	Blue
0	1	0	Green
0	1	1	Cyan
1	0	0	Red
1	0	1	Magenta
1	1	0	Yellow
1	1	1	White

Fig 1 Signal states and resulting colours

Sync, logic and other complications We now have to consider the sync signal(s) and the 'logic' of the signals. The so-called RGB outputs provided on many computers sometimes combine the H and V syncs into a single compound sync signal; sometimes they are left on separate pins; occasionally both compound sync and separate sync signals are provided.

RGB monitors with TTL inputs generally have separate H and V sync inputs, while RGB analogue monitors usually have compound sync inputs. The sync signal does not need to be analogue since sync pulses are logically either on or off. Monitors with TTL inputs, therefore, invariably also have TTL sync inputs, while analogue monitors sometimes use TTL on the sync input (and 1V peak-to-peak analogue inputs for the R, G and B signals) and sometimes one-volt inputs for the signal too!

Combination inputs It's not surprising that manufacturers try to cater for as wide a range of inputs as possible. A little bit of cheating in the input circuitry allows most sets to accept RGB inputs at either analogue (1V peak-to-peak) or TTL levels (0V-5V). Remember, however, that if your computer produces a true



TTL RGB output, only eight colours will be displayable. Some computers use TTL-type voltages, but with a full voltage swing to allow more colours to be displayed. The models looked at here can cope with any voltage likely to be encountered, from half a volt peak up to five volts.

Screen resolution A composite or RGB input to a domestic colour television will result in a cleaner signal getting through, but don't think that means you can display 80 columns where only 40 could be shown previously. Unless you have a monitor with more phosphor dots on the screen (and more perforations in the tube's shadow mask) all you'll get is 40 cleaner characters.

Any attempt to display 80 columns will still result in blurred, unreadable characters.

The machines

The Ferguson MC01, the Fidelity CTM1400 and the Hitachi CPT-1444 sets have much in common: all cost under £230, can receive TV signals off-air and accept RGB inputs. The Ferguson and Fidelity sets can also accept composite video inputs.

The Fidelity CTM1400

The TV/monitor version of this set retails for £229, but a monitor only version (with no internal TV tuner) is available for £199. It has the nearest thing there is to a standard connector, the so-called SCART or Euro-connector. This is a 21-pin connector feeding into 75-ohm analogue inputs. Signals catered for include composite video in and out, stereo sound in and out, RGB analogue at 0.7V peak-to-peak, combined sync and fast blanking.

A wide range of ready-made leads is available for all the popular micros. Resistors in series with TTL outputs from computers drop the signal (by forming a potential divider with the 75-ohm input impedance) and allow the interface to be used with no significant loss of quality.

The only problems likely to be encountered using this model would be with computers producing separate H and V sync signals since there's only a compound sync input. The IBM PC, which produces TTL-level RGB and uses a separate intensity line for a fuller colour range, has to use the composite input for sync purposes and only eight colours can be displayed. All in all it's a

very versatile set, although the manual TV tuning was fiddly.

The Ferguson MC01

This model retails for £229 and is provided with separate RGB and composite DIN-style sockets — seven pins and five pins respectively. Neither of these is standard, but the interface is versatile and should work with virtually any machine. Only a BBC lead was available at the time of the review, but this worked with a clear improvement in the quality of the display on switching from RF to RGB. Two sync inputs are available for machines that produce separate sync outputs, but the sync signals must be negative-going (which is normal anyway).

Combined sync is sorted out internally and simply needs to be plugged into one of the sync inputs.

The Hitachi CPT-1444

This is the cheapest of the models under review, retailing at £210. But, unlike the other two models, it has an RF and RGB input only; there is no provision for a composite video input. Only two types of lead are available — a BBC lead with appropriate plugs at both ends, and a general purpose lead with a DIN-style plug at the Hitachi end and nothing at the computer end. Soldering a suitable connector for your computer will be your responsibility. Adjusting the contrast control allows the input sensitivity to be adjusted for either analogue or TTL input levels. The sync input is for combined sync, and the signal must be negative-going.

Conclusion

Television sets with RGB or composite video inputs do give a worthwhile improvement in quality when used with a computer. Particularly noticeable is the freedom from the irritating drifting dot effect, so common when RF inputs are used. They are not, however, really suitable for 80-column displays. They may have the internal bandwidth to handle 80 characters, but do not have the screen resolution owing to the limitations of the shadow masks on domestic receivers.

If you're in the market for a new colour television and would like some improvement in the computer display, then the few pounds extra these sets cost is well worth considering. This is particularly true if you have a video recorder or disc player with a video output: the lack of a composite input in the Hitachi would then rule it out. The extra £19 spent on either of the other two models gives considerable extra versatility.

In any event, it's a wise precaution to try out your computer with whatever monitor or television you are contemplating.

END

PICK UP THE PHONE FOR THE BEST PORTABLE PACKAGE.

(0280) 816087



FREE SOFTWARE & TRAINING WITH EVERY SYSTEM.

Authorised ACT, SANYO, EPSON &
OSBORNE Service Centre.

(ALL PRICES + VAT)

- Impartial advice from trained consultants.
- On site training.
- On site servicing & fully equipped workshops.
- Complete After Sales telephone support.



FRASER
Associates Limited

Bristle Hill, Buckingham MK18 1EZ Telephone (0280) 816087



Down to Basics

*John Locke gets to grips with business programming in Basic.
Despite its reputation, it can produce fast running and
efficient programs with just a touch of 'style'.*

Basic doesn't have a wonderful reputation in the programming world, but it does have the advantage of being available on most micros in one form or another; and it is capable of producing fast-running and efficient programs. I have known interpretative Basic programs that ran as fast as a compiled COBOL equivalent from the user point of view.

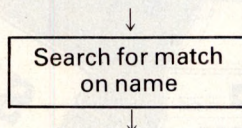
Programming style

One of the surest ways of achieving fast-running programs is to develop an individual programming style—that is, either a personal or a 'house' style. Style implies standardisation. Once you have found a good way of performing a particular program function, stick to it until you have a very good reason for changing it. This also applies to the general structure of the program. Writing the code for this function will then become second nature to you, the bugs will have disappeared long since from that section and it can be typed in almost without thinking. Build up a library of generally useful subroutines and try to give them the same and easily remembered start line number in each application. In this way, the address of the subroutines will be remembered and can be referred to in the program almost without thinking. By implication, the subroutines must be developed to have general application. Other aspects of style will appear in the structure of the program and will be described later.

There is a difference between the structure of programs in general and the structure of a particular application. The structure of a particular application arises from an analysis of the requirements. This must be done thoroughly at the start. Making changes to a 'finished' program because an important requirement was forgotten is time-consuming and may even ruin the efficient structure of the program. That is not to say that the customer's requirements will not change (with bespoke programming they assuredly will), but it is your job to anticipate the changes that might be required at a later stage and allow for their insertion when building the original application structure.

After the analysis of the requirements, construct a flow-chart of a program to meet these. Take as an

example an accounts suite consisting of sales, purchase nominal ledgers together with stock control, sales analysis, ordering, invoicing, and so on; this will occupy between 20 and 25 pages of code. Without a flow-chart it is easy to lose track of where you are. Not only that, but flow-charts should be an essential part of the software documentation. As you code the program in accordance with the flow-chart, add to the block on the diagram the line number that commences the function of the block. This makes the task of tracing through the program much easier later on.



Conventional flow-chart symbols will not always cope with Basic options: ON — GOTO is an example. A multiple exit block rather than a whole row of decision blocks illustrates this (see Fig 1).

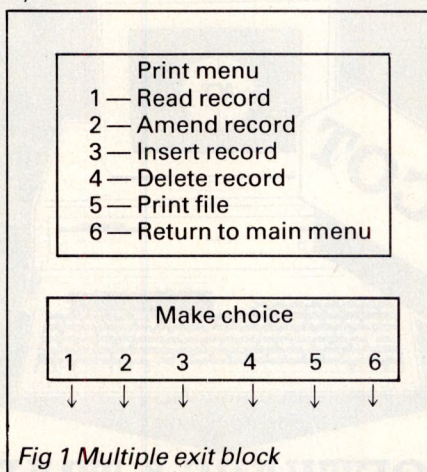


Fig 1 Multiple exit block

Analysis

The first step, obviously, is to analyse your program's requirements before constructing a flow-chart to meet them. While constructing the flow-chart, I find it useful to design all the menus for the program (assuming that menus are to be used) because these will determine the major modules of the program and the sections of the flow-chart. Don't be afraid to redraw the flow-charts several times before you are satisfied with them. In this way all the redundant

sections can be eliminated, the common subroutines highlighted and the many alternatives of achieving the desired results explored.

Strategic decisions which will affect the whole program should be made when the menus are being designed, and reviewed when the flow-chart has been completed. These decisions will include such things as: whether numeric values are single or double precision; whether values are to be held in core in a large array, or as a random file in permanent storage; whether or not the program is to be machine specific; whether each transaction is to be incorporated in the file to which it refers, or in a separate audit file, and so on.

Applying these to an accounting package example, the totals of each nominal account can be turned into a profit/loss report very quickly if these are held in a core array. The difficulty is that even a modest number of accounts — for example, 36 — together with the fact that each could have totals for cash-in-hand, cash-at-bank, VAT (cash), credit, and VAT (credit) for each of twelve months, will occupy $36 \times 12 \times 5$ items. With double-precision values at 8 bytes each, the array will occupy 17k.

If you are using a machine with MBasic (Microsoft Basic) operating under CP/M, then you won't get much change out of 30k for these. In a 64k memory you therefore have 34k for program and variables. I suggest that if a hard disk is available, then use random access files rather than an array. (They are roughly equivalent in that they both allow rapid selection of one set of items.)

Double precision is likely to be a must for monetary values — otherwise, with single-precision, one will be limited to a little over £30,000.00 before the pence disappear; or to £3,000.00 if rational roundings of the pence is to be retained. While double-precision variables may be individually defined throughout the program, this is tedious and the £ sign can easily be forgotten when coding. It is suggested that all variables capable of being grouped in the program should be. For example, all double-precision variables should start with B so that they may be defined with DEFDBL in a group. No reserved words in MBasic begin with B. In addition, J, Q, X, Y, Z are

useful to preface variables that are to be grouped without clashing with reserved words and for defining as single, double-precision or integers in groups. K and H can be used with care.

Memory space limitations will almost certainly force the chaining of the main program modules. Chaining is an advantage anyway, at least with MBasic where all or a choice of variables can be transferred and a start line specified (chaining in BBC Basic is much less flexible). Chaining modules reinforces the structure of the application program and, if properly done, enables each module to be tested separately.

It is essential to have a correctly designed foundation module onto which the other modules overlay. This foundation module has some similarities to the environment division in COBOL but it should go further than that. The foundation module should contain:

(a) A housekeeping section to fulfil such tasks as general definition of variables and dimensioning.

(b) The definition of all the string variables and numeric constants (if any) that will be used throughout the suite of modules. For example, `AS=STRING$(20, " ")` as a useful heading underline, and perhaps `AL$=AS+AS+AS+AS` to give an across-the-screen division.

All string variable arrays that will be frequently used should also be set up at this time. They are either written into the code, or loaded into the array from a file. Account headings would be an example of these, such as: `H$(1)="Rent":H$(2)="Rates"`.

(c) The definition of all screen control characters. For example, MBasic doesn't include a clear screen command because this and other screen controls, such as half brilliance, field protection and cursor control are specific to the particular terminal in use. A program feeding an ICL K9 terminal would require `CL$=CHR$(27)+CHR$(42)` as a clear screen command.

(d) The definition of all printer control characteristics. Commonly used controls will be: top-of-form, £ sign, print size, underlining.

(e) The definition of common messages: for example, `BAD$='Incorrect entry, please try again'`. This is also set up with the screen control for flash or reverse characters as desired or determined by your style.

(f) A table of the *common* variables (those to be transferred from one module to another) if the ALL option of CHAIN is not used.

(g) The program suite heading and main menu together with choice selection.

(h) A chaining table.

(i) Commonly used subroutines.

(j) All file handling subroutines.

The layout of the foundation module is shown in Fig 2.

Housekeeping & variable definition (a to f)
Program suite heading & main menu (g)
A chaining table (h)
Subroutines (i & j)

Fig 2 Foundation module layout

Examining an accounting program in detail should help to clarify the following.

The housekeeping is done by line 10: `10 CLEAR: DIM H$(120), ST1$(10), ST2$(10), SD1$(12), F$(14), IT$(14), DAT$(14), T$(10), TR$(10): DEFDBL B: DEFINT J`

`H$()` is the array to hold the nominal account headings. `ST1$()` and `ST2$()` are the fields in two stock files, one holding stock item data and the other holding stock sales data. `SD1$()` is the array of stock descriptors.

Next come the string variables:

```
15 AS=STRING$(20, " "): AL$=AS+
  AS+AS+AS
20 SD1$(0)="Ref": SD1$(1)="Qty":
  SD1$(2)="Unit": SD1$(3)="Item":
  SD1$(4)="Size" ...
```

The definition of the 12 descriptors in the foundation module will save a lot of space in the overlay modules. For example, to show the first 11 stock details after having selected the stock number and read this record:

```
FOR X=0 TO 10: PRINT SD1$(X);
  TAB(20)ST1$(X): NEXT X
```

is sufficient.

The screen control characters are defined in line 25:

```
25 CL$=CHR$(27)+CHR$(42): BT$=
  CHR$(27)+CHR$(73):
  DEL$=CHR$(27)+CHR$(82)
```

These are a few of the screen control codes: clear screen, back tab and delete line. How these are set up depends on one of the strategic decisions — whether the program suite is to be general-purpose or specific. Give the control codes meaningful but short names like `TOF$` for top-of-the-form or `CL$` for clear screen. You will be using them extensively throughout the program and you won't have to keep referring to your list of variables (which you are of course, keeping as coding proceeds) because this is time-consuming. There is no need to waste memory space and typing-in time by continual use of long variable names: reserve these for when they are essential.

Grouping variables by common starting letters is another way of increasing their intelligibility.

Line 30 defines the printer control characteristics:

```
30 TOF$=CHR$(12): COM$=CHR$(15):
  UON$=CHR$(27)+CHR$(45)+CHR$(1):
  UOFF$=CHR$(27)+CHR$(45)+CHR$(0)
```

These are printer control codes for top-of-the-form, compressed print and

underline on and off.

Line 40 is a sample common message:

```
40 TAIL$='Please pay this invoice
  before the 20th of next month.'
```

The table of common variables comes in line 80:

```
80 COMMON CL$,DEL$,A$,AL$,TAIL$,
  and so on.
```

If memory space permits, it is very much simpler to use the ALL option in the CHAIN command.

Next comes the title and main menu section:

```
100 PRINT CL$:SL$:PRINT SPC(23)
  'Company Accounting and Stock
  Control':PRINT AL$:PRINT SPC(27)
  'Copyright J. D. I. Locke 1984':PRINT
```

This is the title; `SL$` clears an independent status line 25. This will later be used to show the title of the module in use. It is easy to forget which ledger is in use if you are taking a telephone call or a coffee break, especially as the menus can be similar in different sections of the program. The status line is particularly useful for this purpose as it is a non-scrolling line not affected by screen clear and is provided on many terminals. A routine follows the title to display company details and to call for input of the date which will be used throughout the operating session. The latter routine bristles with control codes and validation checks in order to simplify operator input and minimise operator error.

```
105 TEXT$(1)='1-Purchase Ledger':
  TEXT$(2)='2-Sales Ledger':
  TEXT$(3)='3-Nominal Ledger':
  TEXT$(4)='4-Stock Control':
  TEXT$(5)='5-End session'
110 FOR X=1 TO 5: PRINT TAB(30)
  TEXT$(X):NEXT
  X:PRINT:PRINT:KL=1:KH=5:
  GOSUB 520
```

This illustrates one simple method of getting a neat screen layout while minimising the possibility of typing errors in the coding. To obtain the main menu at any time only requires the contents of line 110. `KL` and `KH` are controls for the limit of numeric input at the line 520 subroutine. This in its simplest form could be:

```
520 REM**MENU SELECTION**
525 INPUT'Input the number re-
  quired',K
530 IF INT(K)<>K OR K<KL OR K>KH
  THEN PRINT BAD$:GOTO 525
535 RETURN
```

The basic interpreter will catch the input of a letter rather than a number. The next program line in this section will print the selected choice in the status line by extracting `MID$(TEXT$(K),3,LEN(TEXT$(K)))` and combining it with the necessary control code.

Lines 130-170 are the chaining table. The same line of code will contain `ON K GOTO 130,140,150,160,170` where:

```
130 CHAIN MERGE "PURCH",
  1000,DELETE 1000-9999
140 CHAIN MERGE "SALES",
  1000,DELETE 1000-9999
150 CHAIN MERGE "NOM",
```


PROGRAMMING

```
1000,DELETE 1000-9999
160 CHAIN MERGE "STOCK",
1000,DELETE 1000-9999
170 CLOSE:SYSTEM
```

Note the use of a common starting line and a common deletion range. This type of standardisation speeds the coding by making these references easy to remember. The last line, 9999, is a dummy line well past the end of program coding and is used to contain a REM of the module name. Always refer to this before saving the latest version otherwise you will find yourself over-writing another module on disk.

It can happen — just too easily. The end session is very simple in this case, merely a precautionary file closing before returning to the operating system. It is worthwhile considering back-up of all the data files at this stage. Try to make this operation as automatic as possible so that there is no excuse to skip this chore. You will often find that the operating system can help considerably here. Consider the use of a SUBMIT file to link the program with backup. (It will simplify matters if the suffix .DAT is given to all the data files that need regular backup.)

File-handling

The final section covers file-handling. Generally, the files will be random access, so subroutines will be required to open the file and dimension the fields, to read a record, to write a record and to find a vacant hole in the file for a new record. To give examples of these, the supplier's account file will be used. Twenty records per month have been allocated to each of 150 suppliers, giving 3000 records. At the end of each month, or when all the allocated records have been filled, a statement is printed out and the account cleared to a single brought forward balance. SAC% is used as the record number and is calculated from the supplier reference number, SUP%. The file is called SUPPACC.DAT.

```
250 REM**OPEN SUPPACC**
255 OPEN "R",£3, "SUPPACC.DAT":
FIELD£3,3 AS F$(0),9 AS F$(1),8 AS
F$(2),8 AS F$(3),8 AS F$(4),8 AS
F$(5),8 AS F$(6),8 AS F$(7),8 AS
F$(8):RETURN
260 REM**READ SUPPACC**
265 GOSUB 250:GET£3,SAC%:CLOSE
£3:FOR X=0 TO 8: SAC$(X)= F$(X):
NEXT X: RETURN
270 REM**WRITE SUPPACC**
275 GOSUB 250:FOR X=0 TO 8:LSET
F$(X)=SAC$(X):NEXT X:PUT£3,
SAC%:CLOSE£3:RETURN
280 REM**FIND VACANT SUPPACC**
285 SAC%=SUP%*20-19:GOSUB
250:GET£3,SAC%:WHILE SAC%
<SUP%*20 AND VAL (F$(0))=>1:
SAC%=SAC%+1:GET£3, SAC%:
WEND:LSET F$(0)=MKI$(SAC%):
FOR X=1 TO 8:LSET F$(X)="" :NEXT
X:PUT £3,SAC%:CLOSE£3:RETURN
```

It should be noted that the first field contains the record number when it's occupied, otherwise it is blank. The subroutine at 280 may seem longer than is necessary as the section which writes back the record number only into the vacant record. This is a precaution to be taken in a multi-user system to reserve the vacant record as soon as it is found while the user, or another part of the program, determines its contents. Without this, you could find two users both trying to grab the same record.

This is not the only precaution that has to be taken — other users should be locked out of that file or that record while it is being written to. The use of a single open statement is invaluable during program development, since only a single statement has to be altered should any changes to the file structure be required. The use of common file-handling subroutines does make the adaptation of the program to multi-user simple. All that is required is a jump, at the beginning of the write routines, to a test subroutine to check whether that file is in use and whether that record is in use at the moment. A jump back to the file-sharing routine is made just after the file has been closed to reset the indicators and to release the file again.

In its very simplest terms, with the files only being open for as long as required (as illustrated here) it's possible for a small multi-user system to set a single key when any file is open for writing to inhibit all other access to the files during this time. Even with three users, the resulting delay is negligible. The delay to re-read this key to see if it has been cleared after an unsuccessful attempt need only be of the order FOR X=1 TO 500:NEXT X. Although it is common practice to open all the files necessary at the beginning of the program and then to close them all at the end of a session, I prefer to close most of the files as soon as reading or writing has taken place and accept the slight loss of speed.

Multiple record search

An exception to the above principle is the multiple record search, an example of which is at subroutine 280; here the file is opened at the start of the search and closed at the end. The speed penalty is small and it does save the loss of all the data files when the system crashes.

As another example of multiple record search, assume that there is a file called SUPPLIER.DAT, £5, containing such details as name, address, telephone number, and so on of 150 suppliers (record 151 is a dummy). The record number is given by SUP% and the file is opened by subroutine 310. To search for a particular supplier's name (contained in field F\$(2)) one could use:

```
1100 TB=0: INPUT "Name";NA$:
```

```
GOSUB 2070: IF TB=1 THEN PRINT
"Another try?": GOSUB 500: ON K1
GOTO 1100,1000,1000
2070 GOSUB 310: SUP%=1: GET
£5,SUP%: WHILE SUP%<151 AND
NOT INSTR(F$(2),NA$): SUP%
=SUP%+1: GET£5,SUP%: WEND
2080 CLOSE£5: IF SUP%>150 THEN
PRINT "Name not found": TB=1:
RETURN
```

Note that as the 'while' condition depends on the contents of a field, the file must be read outside as well as inside the loop. The subroutine at 500 is a standard yes/no routine returning K1=1 for yes, K1=2 for no and K1=3 for error. Each module starts at line 1000 with a menu display. The return must not be to a clear screen command, otherwise the message will not be displayed.

Although the above implies that all the files should be random access, sequential files are useful for reading data into an array: for example, the account headings, if they were set up in a separate program.

```
50 OPEN "I",£1, "STARDATA.DAT"
55 FOR X=0 TO 5: INPUT£1,CO$(X):
NEXT X: INPUT£1,M1$: FOR X=0 TO
120: INPUT£1,H$(X): NEXT X:
CLOSE£1
```

In this example, CO\$(X) includes the company name and address, M1\$ the first month in the financial year, and H\$(X) the account headings as described before.

As mentioned, one strategic decision which must be made before program design commences is whether the program is to be machine specific or general. If the latter, then a customising module has to be written. One approach is simply to list the machine specific control characteristics required and then let other users insert the codes to match them.

Research

The other approach is for you to carry out the necessary research into the most popular terminals and printers, and to find out what control codes they will support. You then set up a multiple choice for the user to select the terminal/prINTER that is being used. The program transfers these specific control codes into a file which can be read by the foundation module to match the variable names that have been given to the control codes in the program. The complete set-up program need not be complex and can be covered by a page or so of code.

It is assumed, of course, that all the machines have a common operating system and carry a common Basic variant, hence the use of MBasic for the examples. I'm not a purist when it comes to the use of GOTOs. A pragmatic approach is important and good use should be made of all the tools to hand.

END

PHILIPS

Now, the PC with more offers even more...

Everything you'd expect from the world's leading personal computer – and more. That's the Philips P3100 IBM* compatible PC. More capability. Higher quality graphics. 60% better screen resolution. More room for expansion. Above all, more of a future. For just one very good example, see what it can do with Framework.**

Framework. A software breakthrough.

Framework, from Ashton-Tate** is now available with the Philips P3100.

With Framework you can easily produce spreadsheets and graphics, keep a database and handle word processing. And – here's the clever bit – you can access any function immediately using 'Frames'.

Suppose you're using Framework in its word processing mode and want to check something on the database. With most systems, you would have to change functions. Not with Framework.

You can simply shrink the word processing frame into one corner of the screen and call up the data. You can then shrink that too and call up a spreadsheet. Or graphics. Or another word processing page. It is consistent and easy to use throughout.

So good together.

Framework and the Philips P3100 bring out the best in each other. The P3100's outstanding graphics and screen resolution show off Framework's facilities to perfection.

And, since the P3100 has its graphics capability built in, you don't have to pay extra to get the extras Framework offers.



Memory potential.

In the same way Framework operates fast and effectively in RAM. The P3100 offers more than enough, with its capacity to expand to 512K on the main board.

Whilst we're talking expansion, it's worth remembering that the P3100 has four expansion slots available for additional functions. It really is the personal computer that can grow with you – and with Framework, you'll both blossom even faster.

For full details of the P3100, our free introductory software offer and the address of your nearest Philips dealer, ring 01-200 0200 anytime or clip our coupon now.

Philips... with you every step of the way.

*IBM is a registered trademark of International Business Machines. **Framework and Ashton-Tate are trademarks of Ashton-Tate.

Please tell me more about the P3100 Personal Computer ☐ (please tick).

I would also like information on the following: Business Mini Computer ☐ Multi Station Micros ☐ Portable PC ☐ Word Processors ☐

Electronic Typewriters ☐ Dictation ☐ Telephone Answering Machine ☐ Telephones ☐ Modems ☐ Viewdata ☐ 64 page product catalogue ☐

NAME _____

POSITION _____

COMPANY _____

ADDRESS _____

POSTCODE _____

TELEPHONE _____

PCW P4

To: Philips Business Systems, Elektra House, Bergholt Road, Colchester, Essex CO4 5BE. Tel: Central Enquiry Desk (0206) 575115.



**Business
Systems**

Spreading the word

Messaging facilities play an important part in the concept of portability. Menno Aartsen takes the weight off his arms to examine exactly what constitutes a portable machine, and looks at the electronic mail systems portables can talk to.

The gap is widening between portables which try to emulate desktop machines and those which aim for true portability. The recent introduction of the Apricot Portable is a perfect example: it's a powerful MS-DOS machine, containing everything the computer user needs. A mini-floppy and a full-size screen make it completely independent, anything from Lotus 1-2-3 to an accounting package will happily run on it, and it can be moved from work location to work location quite easily. Yet it's not a true 'portable' computer, a term better reserved for lap held machines. The Tandy Model 100, in particular, has done much for true portability, although some people still think of it as a toy.

A journalist's toy, I should add — journalists were the first true users of the little 100, which enables stories to be written on the spot, on the train and on the plane, and then transmitted to base either direct or via an electronic mail system such as Telecom Gold. Many more professions have discovered the possibilities of these electronic notepads and found that they are quite powerful in their own right. A Tandy 100 with 23k RAM will yield around 29k of user memory, with Basic, a simple text editor and a communications program in ROM. The Epson PX-8, on the other hand, is even more powerful and sports CP/M (with utilities), WordStar, Portable Calc and a scheduler. It has 24k of user memory (which runs out very quickly once WordStar starts creating backup files), supplemented by 29k on microcassette.

But where Tandy has attempted to create a portable with optimum usability, Epson has tried to emulate a desktop computer. The Tandy 100 is the

more useful machine, despite the Epson's 80-column by 8-line display where the 100 only offers 40 columns.

Pocket micros

We'd all like a powerful micro in our pockets, but every extra carries weight. As a journalist I've carried both machines for days on end, covering exhibitions or attending conferences, and started to notice the weight very soon — after all, one usually carries more than just the micro. With acoustic coupler, the usual paperwork, keys and other gubbins, a case can easily weigh in at 10 to 15lbs, which is a lot to carry around all day. In this respect every ounce counts, which is where the Tandy (just over 3lbs) wins easily.

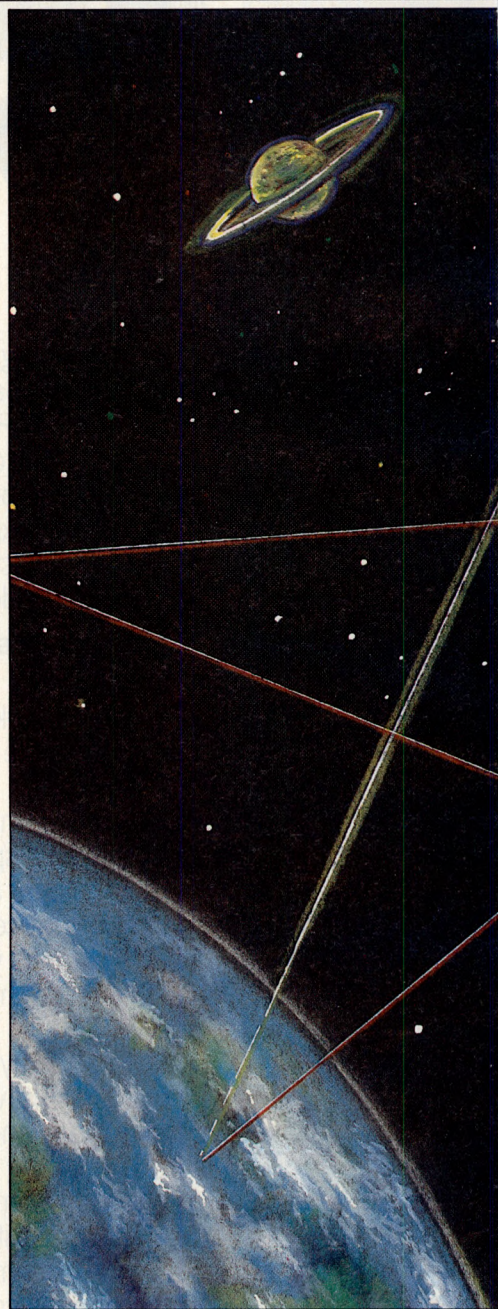
Although Epson has produced a very nice little machine, I can't see the need for PIP and CONFIG in a lap held. Epson does produce a battery-driven floppy, but with four software packages on ROM, built-in microcassette and RS232, I don't really need additional storage space. Once you progress to large files and other software it's surely better to buy a 'full' portable, considering the fact that a PX-8 with two floppy drives, diskettes, coupler, cables, spare batteries and charger can hardly be called 'lap held'.

But it all depends on what you expect to do with a portable, of course. Where the Apricot will happily give you an office computer in any location with a convenient AC socket, the true lap held allows the user to access electronic mail systems and remote databases, or even the office computer. The US company Dialcom, now owned by ITT, started the craze with a viewdata system which could be dialled from within the US, and which would accept text output of, what were then, communicating typewri-

ters, or teletypes. You could leave a message for someone else, receive your own and browse through information pages.

Today, the US alone has dozens of these ASCII databases — no graphics, no colour, the simple standard keyboard character set and lots of info. They vary from CompuServe in Columbus, Ohio, where one finds mostly computer enthusiasts, via The Source in McLean, Virginia, where thousands of teenagers make each other's acquaintance, to Dow Jones News/Retrieval, where stockbrokers can find the latest quotes and read *The Wall Street Journal*.

There are very few 'true' message systems in the States. The latest arrival on the scene is MCI Mail in Washington DC, which offers a gateway to Dow Jones but only provides a mailing service itself. It will allow the user to send surface mail, however, from ordinary two-day post to a four-hour courier delivery in any major popula-





tion centre in the US and Canada.

Which brings us home to Telecom Gold, a British system based on ITT Dialcom software and primarily intended for messaging. Telecom Gold does not run a database, but subscribers do have the facility to make their own available. Gateway facilities are under development, and Roderick Manhattan Associates will shortly start trials, through Telecom Gold, with Manhattan Linq, a European surface mail service with the same possibilities as MCI offers in the States.

The major advantage of a service like Telecom Gold is its link-up with the international packet switching network. From the user's terminal, every ITT Dialcom user in the world can be mailed, and the system can be accessed from any location with a Tymnet node.

Electronic mail

The Tandy 100 is a clever machine: it was designed for use with these electronic mail systems although you can

happily use it as a word processor. Tandy's portable version of Scripsit takes only 4k (as compared with Epson's Wordstar, 33k) and has all the basic processor functions. On the road, however, where you're unlikely to be lugging a printer, its own text editor does handsomely. Provided you have an electronic mailbox, you simply dump the contents of your memory (for safekeeping) and continue working. Since all its internal data is, or can be, converted into ASCII code, anything from your diary to utility software can be transmitted via electronic mail and retrieved the same way.

It's unfortunate that neither Tandy nor Epson have found it necessary to provide built-in modems with their portables. Officially they say BABT approval is a problem, but I suspect that preparing a modem card for a small market would make the machines too expensive. Every European PTT has its own standards, and these standards are different in every country; only the

USA is a big enough market to warrant the development cost. The American version of the 100 thus comes with built-in Bell modem and software for auto-dialling, automatic log-on and automatic data retrieval. All you have to do to read and download your mail or stock market quote is program it, plug it into the telephone socket, press one button and hey presto! — it goes away and does it.

But Britain can't have it, and that's final. Even ACT doesn't bundle terminal software or a modem for its portable; it's all optional, meaning extra pounds and pence. And even if you do get your coupler, modem and terminal emulator, you're not always home free. European buyers of Epson's PX-8 soon noticed that when they started using dial-up services, the terminal program either 'throws' you or simply doesn't work. Why? Epson isn't saying, but I suspect the software contains a modified American terminal package. This was originally intended to work with a

bolt-under Bell modem with its own port, while we in Europe have to make do with the RS232C port as the connection.

Epson-to-Epson works well, but then that is not dependent on correct tones or voltages which differ in the American

'The major advantage of . . . Telecom Gold is its link-up with the international packet switching network. From the user's terminal, every ITT Dialcom user in the world can be mailed, and the system can be accessed from every location . . .'

and European telephone network. Epson users who have experienced these difficulties might like to know that PCW offers a (free) solution (see box).

The use of portables and dial-up services is really tied to professions — private use is simply too expensive. The Epson is a splendid little machine if you happen to have another CP/M computer, so file and software transfer become useful. The PX-8 is specifically configured to talk to Epson's own HX-10 desktop micro, but it wouldn't talk to my Rank Xerox 820-II although the latter would work as a terminal on the Epson. Other than that, you really need the memory expansion pack and/or flop-

pies, both of which make the thing highly unwieldy. The Tandy 100, made by Kyocera which also supplies Olivetti and NEC, does have a limited memory (for some reason the 24k plug-in RAM isn't sold here) but will work as an intelligent terminal and has nice, big readable letters with true descenders, which is useful if you're writing on a train at night. It's virtually impossible to crash and will take a fall or a bucket of water without complaint (yes, both happened to me).

Don't go for a portable unless you really want a portable, and if you do, use it with a mail system. And don't get on electronic mail unless you've got someone to talk to, and if you do, be prepared to pay for it. Telecom Gold is supposed to charge 10.5p per minute during working hours, but if you add the cost of the telephone, you pay between 13 and 15p. Once you're outside of London and have to use PSS the situation gets even worse: a five minute datacall can add another 12p exclusive of VAT. With foreign (American) databases, apart from the dollar exchange rate, the cost of PSS is horrendous: six minutes on The Source cost £1.05 just for the transatlantic connection. Because of the timeshift, you normally end up in either PSS's prime time or in that of The Source, so beware.

Conclusion

Portable computing is good fun, and useful for some, but has a long way to go. You can't make a keyboard smaller and a larger screen does away with

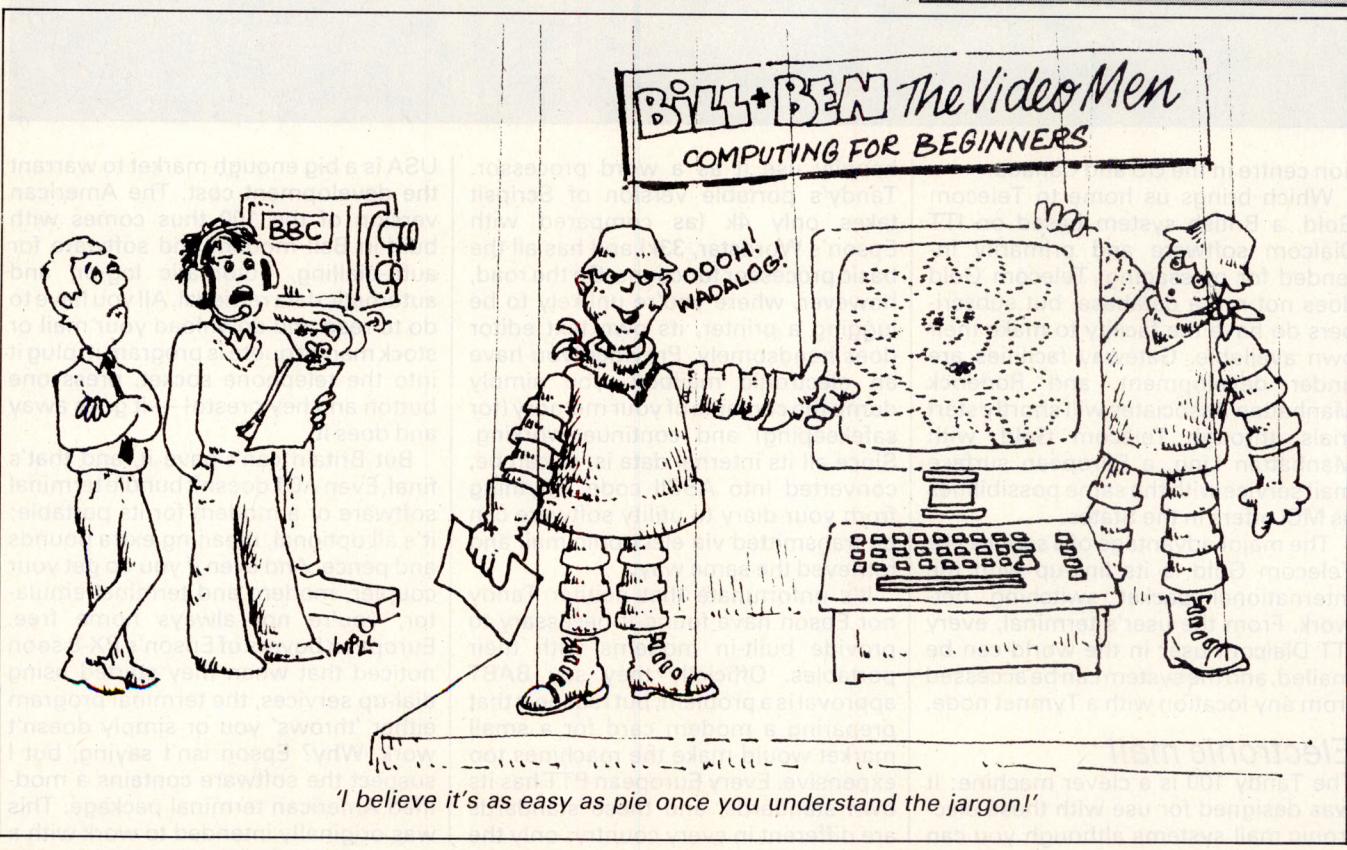
portability, so lap-helds will always be a compromise. Not until a portable with a large internal memory and a real fold-under screen is introduced will we really be able to carry our office around with us.

The Data General One is a step in the

'The use of portables and dial-up services is really tied to professions — private use is simply too expensive. The Epson is a splendid little machine if you happen to have another CP/M computer, so file and software transfer become useful.'

right direction, but we'll have to wait for cheaper technology and make do in the meantime.

PCW readers who own or use an Epson PX-8 may have run into the terminal problems mentioned in this article. Gerrit Slot, who runs the Dutch Epson Users' Club bulletin board, has written a terminal program which is in the public domain, and Epson UK has offered to copy it onto your empty microcassette. If you send it to PCW, along with a suitable sae, it will be returned with a copy of the program. Written in C, it contains an Xmodem option and will take up 11k of RAM.





My job takes me away from my P.C.—but nothing takes me away from my Hewlett Packard Portable.

Working away from the office means working away from the facilities you need to work. Unless you have The Portable.™

The Portable is a fully portable micro computer, weighing under 9 pounds – yet it has all the features you would expect from a desktop machine.

Programs stored in ROM mean you can go to work with full Wordprocessing on MemoMaker, and statistical and spreadsheet functions with Lotus 1-2-3.™

The Portable uses industry standard MS-DOS.® so you can also run all the special software your profession needs.

Work when you are away from work, and plug in to your desktop PC* when you get back to the office. Or you can use our battery powered range of Portable drives, printers and modems, which can travel with you wherever you go.

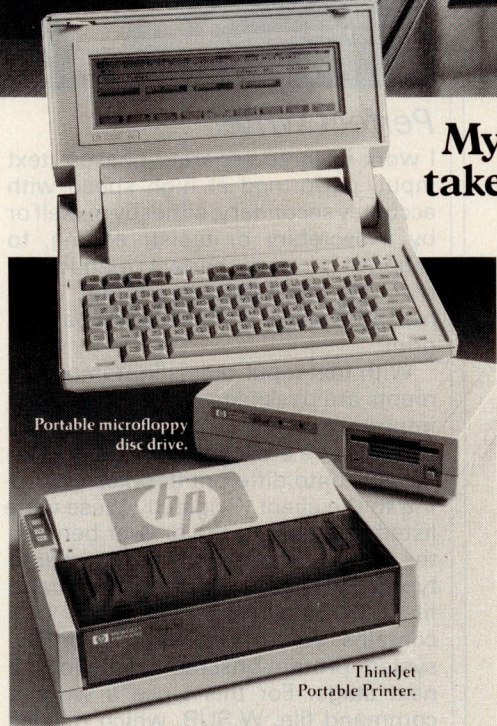
272 Kbytes of RAM, 16 x 80 characters

LCD, 128 x 480 pixel bit-mapped graphics – and a full-sized keyboard – The Portable has more power than many 'full-sized' computers. And a 'Help' function will make sure you can start using your Portable right away.

In fact, with The Portable, you might never want to go back to the office at all.

For more information complete the coupon, or call your nearest HP Dealer for a demonstration.

MS DOS® is a trademark of Microsoft Inc.
Lotus 1-2-3™ are trademarks of Lotus Development Corp.
*The Portable is data-compatible with the IBM PC.



Telephone your nearest dealer now. ABERDEEN (0224): Grampian Comp. Facilities, 692903. Hamilton Rentals, 770816. Tyseal Computers, 647365. BARKING (01): Munro Computers, 591 7000. BASINGSTOKE: Interface Network, 0256 461191. BELFAST: Cardiac Services, 0232 625566. BELPER: Midlectron, 0773 826811. BIRMINGHAM (021): Crellon Microsystems, 643 6365. Hamilton Rentals, 236 3561. Hoskyns Group, 454 5811. John Mabon Associates, 643 6351. United Sumlock, 745 8616. BRADFORD: Eltec Computers, 0274 722812. BRIGHTON: Office Machinery Eng, 0273 689682. BRISTOL (0272): Decimal Business Machines, 214093. First Computer, 277033. MBS Rentals, 277238. United Sumlock, 276685. CAMBRIDGE: Hi-Tek Solutions, 0223 213535. CRAWLEY: W.H. Smith Bus. Comp. Centre, 0293 23778. CROYDON: Computacenter, 01-686 3646. EDINBURGH: Computerland, 031-225 3693. Holdene, 0506 827506. GLASGOW (041): MBS Rentals, 248 5665. Robox Data, 221 8413. Strathand, 946 6497. HARLOW: STC Micros, 0279 443421. HEMEL HEMPSTEAD: Data Efficiency, 0442 60155. HIGH WYCOMBE: Rapid Recall, 0494 26271. KENTON: Compucorp, 01-907 0198. KINGSTON-UPON-THAMES: Interface Network, 01-541 1055. LEEDS (0532): Holdene, 459459. Lieb Systems, 455545. LEICESTER: Sumlock Computer Systems, 0533 29673. LIVERPOOL: KBS Systems, 051-226 6257. LONDON (01): NW10 Hamilton Rentals, 961 6777. SE1 Microplan Communications, 378 6691. SW1 MBS Logic, 222 1122. Protek, 245 6844. SW11 01 Computers, 228 2207. EC1 Anita Business Systems, 253 2444. Concept Computers, 729 1800. Satellite Business Systems, 278 3366. United Sumlock, 250 0505. EC2 Computacenter, 638 4274. First Computer, 638 2103. EC3 Anita Business Systems, 621 1306. EC4 Midlectron/Guestel, 248 0416. MBS Rentals, 626 2181. Merchant Systems, 383 6774. Patrick and Leach, 248 0464. United Sumlock, 626 0487. W1 First Computer, 499 3046. First Computer, 491 7487. Interface Network, 486 9121. W8 Tasha Business Systems, 937 7896. W14 Computacenter, 602 8405. WCI First Computer, 242 1418. Interface Network, 404 4667. WC2 Digitix, 379 6968. Hoskyns Business Centre, 242 1951. Inforem, 340 9832/240 0041. Microplan (Strand), 930 0417. LUTON: First Computer, 0582 458282. GREATER MANCHESTER AREA (061): Computerland 8339327. Hamilton Rentals, 848 8338. Manco Computer Services 860 6600. SALE: Hoskyns Business Centre, 969 3611. STOCKPORT: Automated Business Equipment, 432 0708. WILMSLOW: Holdene, 0625 529486. NANTWICH: Rapid Recall, 0270 627505. PETERBOROUGH: Geest Computer Services, 0733 48087. READING (0734): Care Software Technology, 55521. C.S.E. Computers, 07357 4774. Computacenter, 509911. ROYSTON: Electroplan, 0763 41171. SHEFFIELD: Datron Micro Centre, 0742 585490. SLOUGH: Crellon Microsystems, 06286 4414. Data Supplies, 0753 825820. First Computer, 0753 821545. ST. ALBANS: Albata, 0727 34361. SWINDON: Computacenter, 0793 694997. TUNBRIDGE WELLS: D. J. Herriott, 0892 44918. TWICKENHAM: Simmons Magee Computers, 01-891 4477. WARRINGTON: Applied Micros, 0925 819939. MBS Rentals, 0925 822261. WASHINGTON: Micro Computing, 091 4176018. WINDSOR: MBS Rentals, 07535 68171. WOKING: West Surrey Computers, 04867 88561. WORTHING: Office Machinery Eng, 0903 207292. CHANNEL ISLANDS: The Processor Centre, 0534 77070.

Send to: Freepost, Enquiry Section,
Hewlett-Packard Ltd, Eskdale
Road, Winnersh, Wokingham,
Berkshire RG11 1BR.
Please send me full details on
the Hewlett-Packard Portable.
Tick here if you already have a
desktop computer. ☐

PC type _____
Name _____
Position _____
Company _____
Address _____
Postcode _____ Telephone _____



**HEWLETT
PACKARD**

PCW01

Perfect power

The Perfect suite of programs is familiar as the bundled software with a selection of machines. John Vogler presents various procedures that he's implemented with the package on an upgraded BBC Micro.

Perfect software (in an improved version 2) is shortly to be marketed in the UK by Thorn EMI Software, initially for the IBM PC, with releases for the Apple and Apricot following close behind. The company is already known to CP/M users: for example, the estimated 12,000 users of the Torch and Torch upgrades of the BBC Micro. Recently, a number of other popular and low-cost business micros have been bundling Perfect software with the initial computer purchase: for example, WH Smith's bargain the Ferranti Advance, and the Prism Wren.

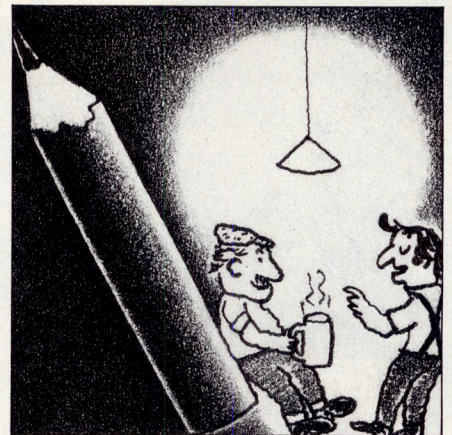
As more and more small businesses discover that home micros with single processors are not sufficiently powerful for their needs, it is likely that an enormous number of people will be cutting their teeth on Perfect software.

Hence this article written by a business user (small-business computing consultant, and management consultant) for business users.

Perfect software (version 1) comes from the States. As bundled in this country it comprises: Perfect Writer word processor, which includes the spelling checker Perfect Speller; Perfect Filer database; and Perfect Calc spreadsheet.

These procedures are for a BBC fitted with a Torch ZEP100 Z80 processor and any dual disk drive. This is the *least* powerful hardware that will run them. Users of the Torch business machine will find only minimal changes are needed from descriptions given here. If they refer to the keyboard diagrams in the Programmers' Guide, they will find that the left-hand pad keys bear a

number whose final digit is the same as the function key number given in this article (f0, f1, and so on). Those with more sophisticated systems will no doubt build on these ideas.



Perfect Writer

I work in three separate phases: text input, performed at high speed with accuracy secondary, either by myself or by a secretary or typist; editing, to produce a word perfect manuscript with all necessary formatting commands in place; and finally, format and print.

With text input only slight improvements are possible, of which the most important is a slick loading sequence. I do not have a winchester disk, so text files go onto different floppies according to the client. Originally these were listed on paper in the drawer beneath the computer. Now I find it's quicker to type D RETURN, which loads command file D.SUB (a display of which disk contains what) that ends with the system prompt onscreen ready for the next stage. For this I use a writer's command file, W.SUB, which resides on each of my Writer/Filer program disks (always placed in top drive 'A') (Fig 1). The user enters:

W <filename> <keyword> RETURN

The file name needs neither the drive prefix 'B:', nor the file name extension .MSS; both are added automatically by argument substitution, using the rules for preparing command files. The keyword is any single phrase which may be frequently repeated during the text, but a shortcoming is that only

```
B 2
VDU 12
;
;           Loading Perfect Writer
;           PLEASE WAIT until menu appears.
;           ...To edit file B:$1.MSS press 'E' followed by red key f0
;           ...To format file B:$1.MSS press 'F' followed by red key f0
;           ...To print file B:$1.FIN press 'P' followed by red key f1
;           Red key f2 has been primed with '$2'
;           NOTE All the above red keys need SHIFT + CONTROL
;
*FX3,6
F 7
*FX11,20
*FX12,8
*FX4,2
*FX226,193,0
*FX228,1
*KEY 0 B:$1.MSS|M
*KEY 1 B:$1.FIN|M
*KEY 2 $2
*KEY 3 |XO
*KEY 4 |F0 ITEMIZE[]|B
*KEY 5 |F0 ENUMERATE[]|B
*KEY 6 |F0 SUBHEADING[]|B
*KEY 7 |F|B
*KEY 8 |F|B
*KEY 9 |D|[F]|B
*FX219,138
*KEY 10 |[F]|D-|[F]
*KEY 11 |[H]
*KEY 12 |[5]|B
*KEY 13 |[5]|F
*KEY 14 |>
*KEY 15 |[C]
*FX5,2
*FX8,4
*FX138,0,13
*FX138,0,77
*FX138,0,69
*FX138,0,78
*FX138,0,85
*FX138,0,13
*FX3
```

NOTE: There should be no space after the @ command: the space has been inserted to disable the command when printing!

Fig 1 Command file W.SUB to load Perfect Writer



upper case words can be used. It's very handy for environment commands or for writing 'Perfect' innumerable times!

Planning ahead, you would need to do the above immediately you sit down to the machine, then, while the disk drives are whirring, you can organise dictaphone, earphones, text being copied, flask of coffee and all the other essentials. By the time attention returns to the screen the disks are silent, ready for a single-letter selection from the menu (such as 'E' to Edit) followed by function key (a red, user-definable key at the top of the keyboard) f0.

An alternative sequence T.SUB is for typists only. It is even quicker to load, requiring only two keystrokes plus the file name, but occupies f8 with an EXEC command that prevents its use for other things.

W.SUB speeds up the auto-repeat and shortens the delay; each user and secretary must tune these to suit their touch. I like a rather fast auto-repeat so that I can zoom the cursor around the screen when editing, but need a longer auto-delay. When writing, I make frequent use of three or four environment commands, particularly: ITEMISE, ENUMERATE and SUB-HEADING. These are programmed into function keys with the vital final bracket (to terminate the environment) in position, but with the cursor pulled back to its correct position *before* the final bracket.

Editing provides the major gains. To the ordinary user it may seem to place

too much importance on tiny time-savings and speed gains. However, to the professional user editing thousands of words a day, be it book, report, news article or broadcasting script, these represent huge increases in productivity and a detailed, complex system is justified. In discussing it I'll refer to command keys, by which I mean the use of a key to perform some task (for example, delete the next word) rather than type a character. Perfect software gives some keys (in different combinations with others) as many as three or four different tasks.

One of Perfect's shortcomings is that you cannot function key definitions while in the program: all have to be pre-defined. W.SUB, therefore, contains an elaborate key definition sequence. Unshifted function keys have been defined by Torch. The handbook omits to mention that the COPY key alone performs the sequence ESCAPE CONTROL W — the CONTINUE SAVING command which is used for gathering isolated fragments of text and indicated by the appearance of a '+' at the right-hand end of the echo line. Use of this makes text gathering much slicker. After gathering text, or just deleting, it may be necessary to discontinue the gathering (denoted by the disappearance of the +). This can be done by either CONTROL G or the DELETE key.

Controlled function keys (depressed while CONTROL is held down) have

also been defined by Torch. Because this has been done for the Torch business machine, it appears rather illogical on the BBC keyboard. They can be redefined using *FX227, but I disagree. Any definition the user imposes is eradicated when the Perfect program is loaded. Again the handbook does not mention that the left arrow cursor key plus CONTROL deletes the word in front of it to the right, which is utterly illogical but quicker than ESCAPE — F.

Using *FX4,2 enables the five grey (ARROW and COPY) keys to be defined, in addition to the 10 red. However, SHIFT and SHIFT + CONTROL function keys cannot be freely defined simultaneously. Define one group (using *FX226,1 or *FX228,1) and the other can only be set in a combination dictated by the list (Appendix C, *Changing the Command Keys*) in the handbook. This appendix has been included for use with a program named WRTBIND.COM, which can be used to alter the command function of any key but which is unfortunately not available. Without it, the user's best hope is to select whichever block of 15 sequential code numbers gives the most useful set of key definitions. My preference is for codes 193 to 208 inclusive. The BREAK key, which is also function key f10, cannot be used in practice but its place can be taken by the TAB key by use of the code *FX219,138.

These codes (imposed by

*FX226,193) form a coherent set of editing controls which, if the SHIFT LOCK is on, can be used single-handed to move the cursor one word, sentence or paragraph in either direction, change to upper or lower case, delete the next word or sentence, or mark the current paragraph for deletion or moving. There is also a command, ignored in the handbook, to indent successive lines by any amount. It requires a VERBATIM environment but is far more flexible than the INDENT environment command, which will only indent by a fixed half-inch.

Perfect Writer's range of commands for moving rapidly through a text, when editing, is already wider than almost any other word processor. You can move by letter, by word, by line, by sentence, by paragraph, by screen or by the whole text. However, some of these are achieved with clumsy 'one-two' commands, such as ESCAPE followed by a key, or by a CONTROLLED key; or CONTROL-X followed by a key, or by a CONTROLLED key. The arrangements described aim at least to reduce these to simultaneous keystrokes. The benefit becomes most evident when repeating the task; for example, moving the cursor three words forward, which can now be done with one finger static on SHIFT while the other taps F5 three times or holds it down momentarily.

This leaves the user to fully define all the function keys with SHIFT + CONTROL, and each user will have his or her own favourites. For many the most important need will be the command to delete a word backwards. This is an essential facility for rapid editing, yet even its laborious one-two form, ESCAPE CONTROL-H, is not mentioned in the handbook. To have it ready to hand, I put it on f11, the COPY key. Still in search of rapid cursor movement, I have defined the left and right arrow keys to move five words either way. The up and down arrow keys find the extreme start and finish of the text, replacing the clumsy ESCAPE SHIFT < and >.

Other SHIFT + CONTROL definitions include f0 and f1, and f2 which contains the key phrase described above. Because I do a great deal of split-screen editing, f4 is used to flip from one window to the other. f4 to f6 contain the environment commands mentioned above, while f7 and f8 automatically insert bold-face and underline commands. f7 sets up the BOLD command for use while inputting text (the command is typed *before* the word), with the final bracket of the environment 'fence' moving ahead of the text. If the word has already been typed, a rapid two-part operation is used. Pressing f7 places the command, complete with closing fence, before the word and f9 then moves the closing fence, one word

at a time, through as many as are to be emboldened. Similarly with underlining. Finally, the TAB key (acting as f10) is used to hyphenate any pair of words.

Alternatively Torch advises that customers buying the MCP Plus-100 upgrade pack will get a utility program, Softkey, which, run on its own will display the function key settings, and run with a filename will create the relevant key definition statements.

Perfect Speller automatically counts the words, but is not accessible during editing. However, f8 not only lists the buffers in current memory but also tabulates their length in characters. The trick therefore is to count the words in a typical piece of text using Perfect Speller, then divide this by the number of characters to find your average word length. There will be surprisingly little variation between different texts, so the character count, divided by this figure, will give a rapid and surprisingly accurate word count.

Perfect Writer has an extensive and imaginative range of commands for document design. They are invoked by instructions that use full key words, such as DESCRIPTION. As well as by defining function keys, this can be avoided by creating standard document headers. For example, HEAD4AR where 4 stands for A4 and AR for article. The header not only defines the page margins: it prepares the environments for the article heading, sub-heading and page headings, and gives the option of turning off page numbers.

For letters (but only to correspondents who are not included on the database) there is L4E4W.M and L5E5W.M (Fig 3) for A4 or A5 paper and envelope. These are loaded using L.SUB, which automatically loads the heading and has slightly different key definitions. Once the address has been typed for the letterhead, pressing f0 automatically copies it onto the envelope which is printed immediately following the letter.

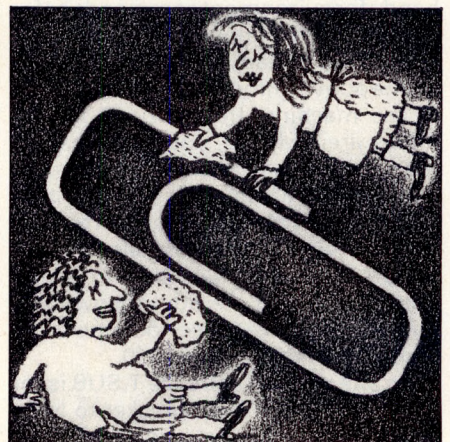
W.SUB speeds up loading and reloading the text file on which you are working. Typing drive letter, colon, file name, extension and RETURN every

time is irritating. W.SUB avoids it elegantly: provided the file name is included as the argument when loading, the whole sequence is contained in f0 thereafter while, to initiate printing, f1 contains the name of the formatted file (with the extension .FIN).

To preview the exact page layout before printing, the handbook instructs that it should be formatted with the console or screen as output, configured identically to the printer. However, viewing a formatted text as it scrolls rapidly past is difficult.

There are helpful error messages generated by the formatting program but they are limited, particularly in respect of one irritating problem. This is the disastrous consequence of omitting the final fence of an environment command, namely that the entire remainder of the document is itemised or enumerated. Whereas most single-character errors can be altered even after printing, this one must be corrected before.

For this I use CON.SUB (Fig 2) which imposes paged mode instead of scrolling so that text can be examined meticulously. Secondly, it defines keys f8 and f9 to search for the left and right square brackets I use as the fences for environment commands. Thirdly, like W.SUB, it speeds up loading and reloading.



Perfect Filer

The Filer database is the weakest

```
B 2
VDU 12
VDU 21

*FX226,1
KEY 0 PW B:$1.MSS|M
KEY 1 VDU 14|MPF -c B:$1.MSS|M
KEY 5 VDU 15|M
KEY 8 |S|[[
KEY 9 |S|[[
VDU6
;
; To display formatted file: press f1
; To show next screen, press SHIFT
; For continuous scrolling press ESCAPE
; To restore scrolling afterwards press f5
;
; To load file on PERFECT WRITER: press f0
; To search for missing environment brackets, press f8, f9 alternately.
```

Fig 2 Command file CON.SUB for viewing formatted text

element of the Perfect suite. One defect is that it only permits one data file to be open at a time and allows only one database file on a whole double-sided data disk. The handbook urges creation of two separate correspondence data files, one for organisations and one for individuals. My correspondents are such a mixture of organisations and individuals that I ignored Filer's templates and merged the two as a single, multi-purpose record.

One difficulty with Filer that can be overcome is the small size of the cursor. This can be changed by VDU 23,0,10,64 which produces a large, flashing cursor. For smaller cursor size, select other values (between 64 and 71) for the final argument.

Another shortcoming is the absence of a browse facility. I have failed to overcome this and shall be indebted to any reader who can help.

I have learned one or two lessons about designing database records. I incorporated a switch — a status field that switches any individual member into or out of a given subset — using yet another command file, S.SUB, which defines user keys to switch members on or off. To economise on keystrokes when defining lists, form letters, and so on, my fields use only a two-character field tag, such as sn. This undoubtedly saves time, but does not provide meaningful subsection headings.

In the light of this experience perhaps full-word tag names, such as 'surname', are justified. Include two or three spare fields so that the standard database can be used for special functions. Spare fields should be alphanumeric.

Perhaps the most important lesson when designing a Filer correspondence database concerns addresses. To analyse correspondents by their location, I designated three fields for ADDRESS, the fourth for CITY, COUNTY or STATE, the fifth for POSTCODE, the sixth for COUNTRY and the seventh for world REGION. This was a mistake which cannot be altered by MOVE, only by changing each member individually.

My database is mainly used for correspondence, so I avoid shuffling program disks in and out of the top drive by holding both Writer (plus its entourage of command files and headers) and Filer on a single program disk, generously protected and backed up. This has been achieved by scouring away all surplus programs. Correspondence that plucks names, addresses, products, prices and other comments off the database is initiated by a completely different command file, M.SUB. Editing facilities on function keys have been replaced with sequences that pick their way through Filer's menu choices. It is loaded by M letter-format ID of correspondent. The ID is Filer's recommended four-digit member identity tag.

Letter formats are of two types: form letters, whose text will be written using

This is for A4 letters that do not use the database.
L5E5W.M for A5 letters is similar

```
@ MESSAGE'INSERT INTERWASTE A4 LETTERHEAD - Top of paper to top of rollers'
@ PAGEFOOTING()
@ STYLE(paperwidth 8 inches)
@ STYLE(paperlength 11 inches)
@ STYLE(topmargin 0 lines)@ COMMENT"So second sheet is full to top!"
@ STYLE(headerspacing 0 lines)
@ STYLE(bottommargin 3 lines)
@ STYLE(leftmargin 5 chars)
@ BLANKSPACE(6 lines)@ COMMENT"Space for letterhead"
@ BEGIN(VERBATIM)@ COMMENT"Address starts next line"
```

```
@ COMMENT"To address envelope, now press RED KEY f3 + SH + CTRL"
@ COMMENT"Next line: write the date"
```

```
Dear @ COMMENT"Delete for personal friends"
```

```
@ CENTER(@ ux[])
@ END(VERBATIM)@ COMMENT"Text starts on next row"
```

```
@ BEGIN(VERBATIM)
```

```
Yours sincerely
```

```
J A Vogler
```

```
@ END(VERBATIM)
```

```
@ NEWPAGE
```

```
@ MESSAGE[Insert A4 envelope - Top of envelope to top of rollers]
```

```
FIRST CLASS @ COMMENT"Delete for second class or airmail"
```

```
@ BLANKSPACE(3 lines)
```

```
@ BEGIN(address)@ COMMENT"Address starts on next line"
```

```
@ END(address)
```

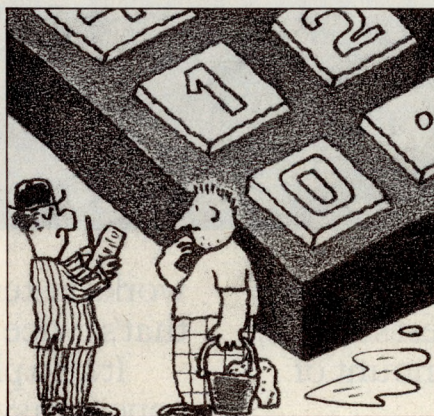
```
@ NEWPAGE
```

```
NOTE: There should be no space after the @ sign: the space has
been inserted to disable the command while printing this Figure!
```

Fig 3 Perfect Writer letter header L4E4W.M

Writer but whose variables and printing are controlled by Filer, are distinguished by a final F in the file name and use Filer's special formatting commands; and individual letters, for which standard headers are fed into Filer to gather date, name, address and salutations, then printed to file. The file B:L.MSS is automatically erased as the first task when M.SUB is run, then recreated for the new batch of letters and loaded automatically into Writer for insertion of text and any editing of the information that came from the database.

Solitary envelopes for bills or parcel labels are addressed using E.SUB. This takes, on average, 43 seconds to address an envelope from a cold start; a second envelope takes only 10 seconds more. For a single envelope the computer is thus much slower than addressing by hand, the only way to improve this would be to buy a Winchester disk drive. Finally, such a plethora of command files and headers needs its own index, both on paper and on yet another quick-to-load command file, Q.SUB.

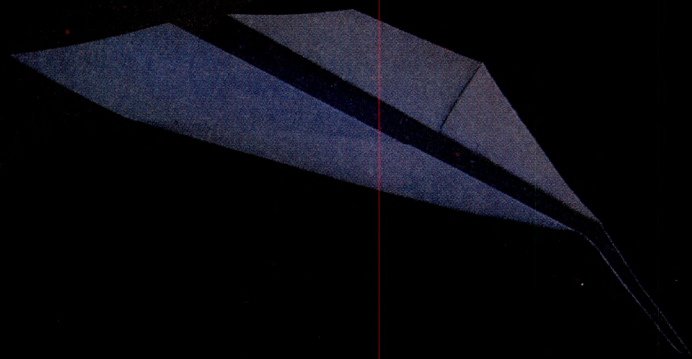


Perfect Calc

I loaded Perfect Calc with S.SUB, which

switches on the printer and defines the function keys with a number of commonly used processes or part processes. The normal and CONTROLLED keys are already defined by Torch. Once again, each user will find certain functions are either inconvenient or commonly used and define his own. To demonstrate the scope, my SHIFTed keys are: f0 starts the first task after loading; to alter the width of the current column; ready for the new number. f1 moves to the top of the sheet and f2 to the bottom. f3 splits the screen, horizontally, at the centre line; saves failed commands due to an unsuitably placed cursor. f4 prepares for creation of a sum formula. f5 converts all numerical entries to integers. f6 draws a continuous line across the screen, and indexes the cursor one column to the right. Holding this key down thus draws a line across the spreadsheet, regardless of column widths. f7 does the same with a line of asterisks. f9 puts the current cell into edit mode, with the cursor positioned at the right-hand end of the text. Arrow keys all jump the cursor five lines or columns. The COPY key switches from one window to another. Users of the Torch business machine may have already discovered that despite the handbook's statement to the contrary, the left-hand keypad and EXACT SPACE key have already been configured for Perfect Calc.

The PCCONFIG.COM program that redefines all Perfect Calc keys is provided, so it is unnecessary to use SHIFTed and CONTROLLED function keys. However, to change them sacrifices the enormous benefit of Calc and Writer using identical codes: for example, to save the current file, CONTROL-X CONTROL-S or F5 on both. This elegant simplicity evaporates if Calc keys change when Writer's cannot. **END**



It is an interesting paradox in business, that those who achieve the greatest success, appear to do so with the least amount of work.

This illusion of relaxed inactivity is considerably heightened by the Wang PC. Like its human counterpart, the Wang

works faster than its rivals. Put another way, that's twice as fast as an IBM PC*.

It also plays its part in making the work appear easy.

There's no referring back to manuals, all instructions appear on the screen. And should there be a moment's uncertainty,



Invariably, the man with most on his mind has least on his desk.

our unruffled executive merely touches the key marked 'help'.

It's no accident either that the Wang PC looks neater than others. Not only is it physically smaller, but as you can see, the screen uses no desk space at all.

But then a busy man ought to have

somewhere to put his feet up.

For further information on the Wang PC phone Teledata on 01-200 0200.

WANG

The office automation computer people.

WANG (UK) LTD., 661 LONDON ROAD, ISLEWORTH, MIDD.

It takes all sorts...

If you think that every important aspect of programming arises somewhere in the context of sorting and searching, then you're in full agreement with master programmer Donald Knuth. Mike Liardet looks at Sorting and Searching, the third volume of his book, The Art of Computing Programming.

```

10000 REM INITIALIZE
10010 INPUT "NUMBER OF RECORDS TO SORT";N
10015 IF N<0 OR INT(N)<>N THEN PRINT CHR$(7):GOTO 10010
10020 INPUT "RANGE OF KEYS 1 TO..(OR 0 = IN ORDER, -1 = REVERSE ORDER)";HI
10025 IF HI<-1 OR HI>1E+08 OR INT(HI)<>HI THEN PRINT CHR$(7):GOTO 10020
10030 GOSUB 30000
10040 PRINT "SORT METHOD..."
10045 PRINT " 0. STOP"
10050 PRINT " 1. INSERTION SORT"
10060 PRINT " 2. SHELL'S SORT"
10070 PRINT " 3. QUICKSORT"
10080 PRINT " 4. DISTRIBUTION COUNTING"
10100 INPUT "ENTER 0 TO 4";CH
10105 IF CH<0 OR CH>4 OR INT(CH)<>CH THEN PRINT CHR$(7):GOTO 10100
10107 IF CH=0 THEN STOP
10110 ON CH GOSUB 20000,21000,22000,23000
10115 PRINT CHR$(7);CHR$(7);CHR$(7);
10120 GOSUB 31000
10130 RUN
20000 REM INSERTION SORTING - N ITEMS IN K() AND R$()
20010 FOR J=2 TO N
20020 K=K(J):R$=R$(J)
20030 FOR I=J-1 TO 1 STEP -1
20040 IF K>K(I) THEN 20080
20050 K(I+1)=K(I):R$(I+1)=R$(I)
20060 NEXT I
20070 I=0
20080 K(I+1)=K:R$(I+1)=R$
20090 NEXT J
20100 RETURN
21000 REM SHELL'S SORT
21010 DIM H(15)
21020 H(1)=1
21030 FOR I=2 TO 15
21040 H(I)=3#H(I-1)+1:IF H(I)>N THEN 21070
21050 NEXT I
21060 PRINT "N":7174453 ERROR:STOP
21070 T=I-2:IF T<1 THEN T=1
21080 FOR S=T TO 1 STEP -1
21090 H=H(S)
21100 FOR J=H+1 TO N
21110 K=K(J):R$=R$(J)
21120 FOR I=J-H TO 1 STEP -H
21130 IF K>K(I) THEN 21170
21140 K(I+H)=K(I):R$(I+H)=R$(I)
21150 NEXT I
21160 REM ASSUMES I IS DEFINED ON COMPLETION OF FOR-LOOP
21170 K(I+H)=K:R$(I+H)=R$
21180 NEXT J
21190 NEXT S
21200 RETURN
22000 REM QUICKSORT WITH INSERTION SORTS FOR M OR LESS ITEMS
22010 DIM LSTACK(20),RSTACK(20)
22015 INPUT "M VALUE (EG 9)";M
22020 IF N<M THEN 22150
22030 TOP=0:LFT=1:RGHT=N:K(0)=-1E+10:K(N+1)=1E+10:REM !!!GOTO 22040
22031 LFT=0:RGHT=N+1
22032 SWAP K(INT((LFT+RGHT)/2)),K(LFT+1):SWAP R$(INT((LFT+RGHT)/2)),R$(LFT+1)
22034 IF K(LFT)>K(LFT+1) THEN SWAP K(LFT),K(LFT+1):SWAP R$(LFT),R$(LFT+1)
22036 IF K(LFT+1)>K(RGHT) THEN SWAP K(LFT+1),K(RGHT):SWAP R$(LFT+1),R$(RGHT)
22038 IF K(LFT)>K(LFT+1) THEN SWAP K(LFT),K(LFT+1):SWAP R$(LFT),R$(LFT+1)
22039 LFT=LFT+1:RGHT=RGHT-1
22040 K=K(LFT):R$=R$(LFT)

```

Fig 1 Sorting program

Sorting is the process of arranging things in ascending or descending order. Knuth points out that the layman's use of 'sorting' means something slightly different, and computer sorting could more correctly be called 'ordering', or 'sequencing'. In some senses sorting is related to the other topic in the volume, searching. This is because searching becomes a great deal easier once the items are sorted; imagine looking for a word in an unsorted dictionary.

Knuth divides sorting into two categories, internal and external. Internal sorting is used when all the data can be accommodated in high-speed internal memory, or RAM. External sorting is used when some, or most, of the data lies in external memory such as disks or tape, which are a great deal slower to access. This difference in access speed necessitates different approaches to the two types of sorting.

A prerequisite for external sorting is an ability to do internal sorting. However, as external sorting strategies are influenced by the hardware available and are generally more complex, I'll stick to internal sorting.

For internal sorting, Knuth presents well over two dozen different algorithms. It's not easy to pick a 'best' one, since different algorithms are better in different situations. It is, however, fairly easy to identify the worst one, called 'bubblesort'. For some perverse reason bubble sorting has enormous popularity with programmers, possibly because it's easy to remember when Knuth's volume is not to hand. I'll present some of the more highly recommended routines.

A program that will enable you to test four of Knuth's sorting algorithms in a variety of different circumstances is listed in Fig 1. In all cases the data, or rather 'keys' to be sorted, are integer values in the array K(). For each key in K(), there is an associated record in the array R\$(). For most sorting applications, it is not merely sufficient to sort the keys, but also the associated records: a telephone directory with the names sorted but the numbers in the

Fig 1 continued

```

22050 I=LFT:J=RGHT+1
22060 I=I-1:IF K(I)<K THEN 22060
22070 J=J-1:IF K(K(J)) THEN 22070
22080 IF J=I THEN SWAP K(I),K(J):SWAP R$(I),R$(J):GOTO 22060
22090 SWAP K(LFT),K(J):SWAP R$(LFT),R$(J)
22100 IF RGHT-J=J-LFT AND J-LFT>M THEN TOP=TOP+1:LSTACK(TOP)=J+1:RSTACK(TOP)=RGHT:RGHT=J-1:GOTO 22040
22110 IF J-LFT>RGHT-J AND RGHT-J>M THEN TOP=TOP+1:LSTACK(TOP)=LFT:RSTACK(TOP)=J-1:LFT=J+1:GOTO 22040
22120 IF RGHT-J>M AND M=J-LFT THEN LFT=J+1:GOTO 22040
22130 IF J-LFT>M AND M=RGHT-J THEN RGHT=J-1:GOTO 22040
22140 IF TOP>0 THEN LFT=LSTACK(TOP):RGHT=RSTACK(TOP):TOP=TOP-1:GOTO 22040
22150 IF M>1 THEN GOSUB 20000
22160 RETURN
23000 REM DISTRIBUTION COUNTING
23010 IF HI>1000 THEN PRINT CHR$(7):"KEY RANGE > 1000!!":RUN
23020 U=1:V=HI
23030 DIM COUNT(V-U)
23040 FOR I=0 TO V-U:COUNT(I)=0:NEXT I
23050 FOR J=1 TO N:COUNT(K(J)-U)=COUNT(K(J)-U)+1:NEXT J
23060 FOR I=1 TO V-U:COUNT(I)=COUNT(I)+COUNT(I-1):NEXT I
23065 R=N
23070 IF R=0 THEN RETURN
23080 IF COUNT(K(R)-U)<R THEN R=R-1:GOTO 23070
23090 IF COUNT(K(R)-U)=R THEN COUNT(K(R)-U)=COUNT(K(R)-U)-1:R=R-1:GOTO 23070
23100 R$=R$(R):K=K(R):J=COUNT(K(R)-U):COUNT(K(R)-U)=COUNT(K(R)-U)-1
23110 S$=R$(J):S=K(J):L=COUNT(K(J)-U):COUNT(K(J)-U)=L-1:R$(J)=R$(J):K=R$:S$=S$:K=S:L:IF J<R THEN 23110
23120 R$(J)=R$(J):K=K(J):K=R$:R=R-1:GOTO 23070
30000 REM SET UP K(I) AND R$(I) WITH N VALUES DETERMINED BY HI
30010 DIM K(N+1),R$(N)
30020 FOR I=1 TO N
30030 IF HI>0 THEN K(I)=INT(RND(1)*HI+1)
30040 IF HI=0 THEN K(I)=1
30050 IF HI=-1 THEN K(I)=N-I+1
30060 R$(I)=STR$(K(I))
30070 NEXT I
30080 IF HI<=0 THEN HI=N
30090 RETURN
31000 REM CHECK K(I) IS SORTED AND R$(I) IS IN STEP WITH IT
31010 FOR I=1 TO N
31020 PRINT I,K(I)
31030 IF K(I)<>VAL(R$(I)) THEN PRINT"***RECORD ERROR***"
31040 IF I=1 THEN 31060
31050 IF K(I)<K(I-1) THEN PRINT"***ORDER ERROR***"
31060 NEXT I
31070 RETURN

```

original order would be quite useless! In some actual applications the keys may be an integral part of the record or they may be textual, and so on. Once you understand the algorithms it is relatively easy to tailor them to fit the specific sorting problem.

The program is structured as shown in Fig 2.

```

Line 10000 — Initialisation and menu control
Line 20000 — Insertion sorting routine
Line 21000 — Shell's sorting routine
Line 22000 — Quicksort routine
Line 23000 — Distribution counting routine
Line 30000 — Routine to initialise data to be sorted
Line 31000 — Routine to print and check sorted data

```

Fig 2 Sorting program structure

The simplest sorting algorithm is called 'insertion sorting'. Imagine a situation where the list of keys is partitioned in two, with a sequence of keys in order up to a given point, and thereafter out of order. For example:

2 3 5 6 4 8 9 7 1

By scanning the values to the left of the marked key, we can gradually move these values one place right until we arrive at the right place to insert the marked key. This increases the size of the sorted partition by one. The above example would become:

2 3 4 5 6 8 9 7 1

By repeatedly applying this method,

the sorted partition grows until all the keys are sorted. To get it started, only the first key is deemed to be sorted since any single value must be 'sorted', no matter what it is. Initially all keys, bar the first, are in the unsorted partition. In the Basic routine (Fig 1, line 20000) the variable J marks the boundary between the two partitions, and K is used to hold

the key to be inserted — it cannot be left *in situ*, as it would be overwritten by the shuffling up to accommodate it.

Shell sorting was devised by Donald L Shell in 1959. In some sorting algorithms, the keys are only moved short distances at a time; this can be highly inefficient if the keys have to move a long way. Shell's method 'encourages' the keys to move in long jumps initially, and it then works out the details later by successfully shorter jumps, or 'increments'. If the increments are successively 4, 2 and 1, the following nine keys would be sorted as follows:

5 7 9 4 3 1 2 6 8
* * *

4-sort. .

3 1 2 4 5 7 9 6 8
* * * * *

2-sort. .

2 1 3 4 5 6 8 7 9
* * * * * * *

1-sort. .

1 2 3 4 5 6 7 8 9

In effect the 4-sort does an insertion sort on four independent sequences of keys, where in each sequence the keys are four apart. The first of these sequences (marked with asterisks) comprises the keys 5, 3 and 8. The second comprises the keys 7 and 1, and so on. Note that all four of these sequences are correctly sorted following the 4-sort. The 2-sort does the same thing for just two sequences, with keys two apart. Finally, the 1-sort sorts a single sequence of adjacent keys and gets everything in the right order. In fact, the 1-sort is identical to the insertion sort.

Any sequence ending with 1 will work. (Insertion sorting is a special case of the method with a single increment of 1 being used.) In fact powers of 2 provide a fairly poor performance, and after extensive analysis Knuth suggests some better alternatives. One of these is the sequence used in the routine here (Fig 1, line 21000). The increments are produced from the expression $(3^K - 1)/2$, with values of K decreasing from some initial value down to 0. (The code given does calculate these values but without recourse to exponentiation, and the increments are held in the array H().) The initial value used is the largest possible, not exceeding one third of the number of items to be sorted. For example, to sort 1000 keys the increments would be 121, 40, 13, 4 and 1.

Quicksort

The Quicksort method was devised by C A R Hoare in 1962. This is one of the more complex methods to code (Fig 1, line 22000) particularly if the implementation language is not recursive — as is the case with Basic. In its basic form, a list of keys is sorted by choosing the first key as a 'pivot' and then dividing the remaining keys into two partitions: keys to the left being less than, or equal to, the pivot; and to the right being greater than, or equal to, the pivot. To obtain these two partitions we scan right from the first key after the pivot until we find a 'rogue' key (greater than the pivot) and scan left from the end until we find another rogue key (less than the pivot). These keys can then be swapped, and this continues until the right scan crosses the left; this is the correct position for the pivot element. For example, quicksorting the following numbers:

5 7 9 4 3 1 2 6 8

Exchange 7 and 2. .

5 2 9 4 3 1 7 6 8

Exchange 9 and 1. .

5 2 1 4 3 9 7 6 8

Place pivot (exchange 5 and 3) . .
3 2 1 4 5 9 7 6 8

At this point the 5 is correctly placed; all the values to the left of it are less than it, and all those to the right are greater. Sorting these two partitions can be seen as two separate independent problems, so we can continue by quicksorting 3, 2, 1 and 4, and then quicksorting 9, 7, 6 and 8, and so on.

There are various refinements to this method. As insertion sorting is generally regarded as the most efficient method for small lists, we can invoke insertion sorting instead of quicksorting when the lists get below a particular size (the value M in Fig 1 at line 22000). There's nothing to lose by abandoning the sorting when a list gets below size M, and then calling insertion sorting just once for the whole list, right at the end. Note that if M is 1, then pure quicksorting is used.

A major problem with quicksorting is that it's at its worst when the list is already sorted. Unlike most methods, it's at its best when the keys are scrambled. This seems very unsatisfactory, and can be corrected to some degree by arranging for a more careful choice of pivot. The method recommended by Knuth is to first interchange the second and middle keys in the list, then sort just the first, second and last keys, pivoting on the middle one. For the aforementioned sequence:

5 7 9 4 3 1 2 6 8

Swap second and middle. .

5 3 9 4 7 1 2 6 8

Sort first, second and last only. .

3 5 9 4 7 1 2 6 8

Now partition the third to last keys using 5 as the pivot. .

3 5 2 4 1 7 9 6 8

Insert pivot in the right position. .

3 1 2 4 5 7 9 6 8

This procedure makes little difference to randomly ordered keys, and considerably improves the situation if the keys are already ordered.

Both these enhancements are incorporated in the routine at line 22000. The routine prompts for a suitable value of M before starting: Knuth recommends 9 as optimum, although the best value depends on the characteristics of the programming language you are using. Lines 22031 to 22039 make a careful selection of the pivot. Simple pivot selection is obtained by deleting the REM at line 22030.

In circumstances where the keys are numeric and have a restricted range of values, a very efficient sorting procedure can be applied by noting the frequency of occurrence of each key. This is the strategy adopted by 'distribution counting' sorting. The first phase of the algorithm obtains the number of occurrences for each key. In Fig 1 at 23000, if the lowest key value is U and the highest is V, then COUNT (O)

holds the number of occurrences of U, and COUNT (V-U) holds the number of occurrences of V. For example, the counts for the 2 3 1 1 3 2 1 2 2 would be:

1-count: 3

2-count: 4

3-count: 2

Once sorted, we will see 3 '1's followed by 4 '2's, followed by 2 '3's. If each of the counts is now accumulated, for example, the 2-count becomes 3+4 and the 3-count becomes 3+4+2, then the value in each count will indicate the last position for each of the corresponding keys:

1-count: 3

2-count: 7

3-count: 9

So the '1's will appear in position 1 to 3, the '2's in 4 to 7, and the '3's in 8 to 9.

Now, scanning the numbers from right to left, we search for a key which is too far to the left:

*

2 3 1 1 3 2 1 2 2

The totals in the counts make this test relatively easy, and the found key can be inserted at the position indicated by its count (position 9):

2 3 1 1 2 1 2 2 3

By adjusting the counts and repeating this process, it is then possible to get all the keys into the correct order. Fig 1 (at line 23000) contains extra sophistications which further minimise the amount of scanning and moving needed to sort the keys.

In order to assess how effective these different algorithms are, Fig 3 outlines the results of running each of them under various conditions. The times are in minutes and seconds (obtained in interpreted Microsoft Basic on an ACT Apricot — some appreciation of the performances can be gained by noting that it takes all of 12 seconds just to initialise the data for 500 keys). £ signs indicate times definitely in excess of 10 minutes and estimated to be about one hour, demonstrating the appalling behaviour of standard Quicksort if the keys are ordered. The following conclusions can be drawn.

Insertion sorting is good for short-lists but hopeless for long ones, unless the list is already, or very nearly, in order. (All methods appear equal for

short lists in Fig 3, but this is due to inadequacies in my reflexes.) This is the only method considered here that maintains equal keys in their original order — this can be important for some applications.

Shell sorting performed well on all tests, with consistent response times no matter what the state of the input.

Quicksorting is excellent for random lists, but no use for ordered lists. Pure Quicksorting (when M=1) is slightly slower than Quicksort combined with insertion sorting. More careful selection of a pivot value mitigates the ordered list problem.

Distribution counting was best all round, but is not universally applicable.

If asked to nominate a good, general-purpose, workhorse sort routine I would choose Shell sorting. In fact it would not be difficult to write a super-sort procedure which, from a preliminary scan of the data, could choose the most appropriate routine. Knuth covers another 20 or so possible algorithms.

Searching

Of the two topics, Knuth gives far more prominence and material to sorting. Searching is concerned with retrieving data that has been stored with a given identification. The identification is the 'key', and the data is the associated 'record'.

Sequential searching is the most obvious technique for searching a list: start at the front, and keep going until either you find the key you want or reach the end. On average half the keys are scanned for a successful search, and all of them are scanned for an unsuccessful one.

A more efficient technique, which is almost as simple to implement, is called binary search (Fig 4); this only works if the list is in order. Given an ordered list of keys, examine the middle one, which will either be greater, less, or equal to the key we are seeking.

If it's equal then we have successfully found the key. If it's less than the given key, then we can continue searching for the key in the right half of the list, otherwise continue on the left. The search terminates unsuccessfully

Range of keys Init ordering	500 keys			20 keys	
	1. 500	1. 10	1. 500	1. 500	1. 20
	Random	Random	In order	Reversed	Random
Insertion	16:17	14:37	0:14	>20:00	1.5
Shell	1:55	1:26	1:03	1:35	1.5
Quicksort (M=9)	1:01	0:50	£££££	££££££	1.5
Quicksort (M=1)	1:03	0:58	£££££	££££££	1.5
Quicksort + (M=9)	1:00	0:51	7:30	7:04	1.5
Quicksort + (M=1)	1:02	0:59	7:18	6:52	1.5
Distr. Counting	0:34	0:27	0:26	0:34	1.5

Fig 3 Performance of the sort routines

when there is no list left, when lower pointer L exceeds upper pointer U in the routine given.

As it's a more efficient technique, binary search can be blindingly fast even for very long lists. A maximum of 20 comparisons would be made to search a million keys — quite an improvement on straight sequential search. Marginal improvements have been suggested — not examining the middle element every time, but making a more careful choice determined by the key we are seeking. In practice, the increase in complexity offsets any other gains.

Binary trees

Frequently, following an unsuccessful search, we may wish to insert the unfound key. If we are using binary search, then this can be computationally expensive for long lists of keys. If, instead of storing the keys sequentially, a 'binary tree' structure can be used, then binary search and easy insertion can coexist (Fig 5). The price for this is that the tree requires slightly more storage and is more complex to scan.

A binary tree is built up of 'nodes'. Each node contains the text of one key, and pointers to the before and after

nodes. (In real applications there may be other information as well.) These pointers reference other nodes from which all the words before or after the current node can be accessed. If there are no other nodes, the pointers are simply 'null'.

A binary tree is searched, starting at the root node. If this node contains the key then we have found the place we want. Otherwise the key must be before or after the current node, and we move to the next node accordingly and repeat the process.

If there is no next node then the key is not in the tree, and we can insert it at this point if necessary.

This method works best with storage management routines to allocate and de-allocate storage as nodes (that is, keys) are added and deleted. In the routine given here only minimal storage management is attempted to keep things simple.

In some cases a binary tree can become unbalanced. The worst case occurs if the keys are inserted in order, when the algorithm just performs an unnecessarily complex sequential search. If the keys are presented in a suitably random order, then all the branches will be at roughly the same depth. Knuth also presents techniques for keeping trees well balanced.

Throughout this analysis we have assumed that it is readily possible to identify two keys as being equal. But when working on an interactive system, it can sometimes be a problem to recall the precise spelling of a word, such as a surname. Knuth presents a technique, called soundexing, which can convert similar sounding words into the same key (Fig 6). The technique was developed by Margaret Odell in 1918, predating computers by a good many years. Essentially the method converts any word into a key, consisting of a letter followed by three digits. Similar sounding letters are assigned the same digit; vowels and a few other letters are ignored altogether, as are repeated letters.

Conclusion

This concludes my presentation of Knuth's three volumes on *The Art of Computer Programming*. It should be remembered that these volumes run to over two thousand pages in total, so I have had to be highly selective as to which material I have featured.

Unfortunately many interesting and pertinent algorithms have fallen by the wayside, and if my writings have whetted your appetite for more information then you will have to buy the volumes to find out more.

References

The Art of Computer Programming, by Donald E Knuth; Addison-Wesley Publishing Company.
Volume 1 Fundamental Algorithms
Volume 2 Seminumerical Algorithms
Volume 3 Sorting and Searching **END**

```
35000 REM BINARY SEARCH FOR K IN N KEYS IN K(), RETURNS POSN (=-1 FOR FAILURE)
35010 L=1:U=N
35020 IF U<L THEN POSN=-1:RETURN
35030 POSN=INT((L+U)/2)
35040 IF K<K(POSN) THEN U=POSN-1:GOTO 35020
35050 IF K>K(POSN) THEN L=POSN+1:GOTO 35020
35060 RETURN
```

Fig 4 Binary search routine

```
50000 REM BUILDS AND SEARCHES A BINARY TREE
50010 DIM KEY$(1000),BEFORE(1000),AFTER(1000)
50020 KEY$(1)="ROOT":BEFORE(1)=0:AFTER(1)=0
50030 AVAIL=2
50040 INPUT"TYPE A KEY";KEY$
50050 GOSUB 51000:IF FOUND=1 THEN PRINT"ITS AT NODE ";NODE:GOTO 50040
50060 PRINT"NOT FOUND - INSERTING IT"
50070 GOSUB 52000
50080 PRINT"AND ITS AT NODE ";NNODE:GOTO 50040
51000 REM SEARCH BINARY TREE SETS FOUND AND NODE
51010 NODE=1:REM START AT ROOT
51020 IF KEY$=KEY$(NODE) THEN FOUND=1:RETURN
51030 IF KEY$<KEY$(NODE) AND BEFORE(NODE)<>0 THEN NODE=BEFORE(NODE):GOTO 51020
51040 IF KEY$>KEY$(NODE) AND AFTER(NODE)<>0 THEN NODE=AFTER(NODE):GOTO 51020
51050 FOUND=0:REM FAILURE (BUT NODE SET FOR INSERTION)
51060 RETURN
52000 REM (FOLLOWING UNSUCCESSFUL SEARCH) CREATE AND INSERT A NODE FOR KEY$ BEFORE/AFTER NODE
52010 IF AVAIL>1000 THEN PRINT"STORAGE OVERFLOW!":STOP
52020 KEY$(AVAIL)=KEY$:BEFORE(AVAIL)=0:AFTER(AVAIL)=0:NNODE=AVAIL:AVAIL=AVAIL+1
52030 IF KEY$<KEY$(NODE) THEN BEFORE(NODE)=NNODE:RETURN
52040 AFTER(NODE)=NNODE:RETURN
```

Fig 5 Binary tree program

```
40000 REM SOUNDEX FOR ANY X$ (<>"") AND CONTAINING ONLY "A" TO "Z"
40010 DATA "AEHIQUWY","BFPV","CGBJKQSXZ","DT","L","MN","R"
40020 DIM GROUP$(6):FOR I=0 TO 6:READ GROUP$(I):NEXT I
40030 REM GROUP$(0) IGNORED, OTHERWISE A LETTER IN GROUP$(I) HAS DIGIT I
40040 SNDEX$=LEFT$(X$,1):REM FIRST LETTERS OF SOUNDEX AND X$ ARE THE SAME
40050 C$=SNDEX$:GOSUB 41000:OVAL$=VALU$
40060 FOR I=2 TO LEN(X$)
40070 C$=MID$(X$,I,1):GOSUB 41000
40080 IF VALU$="0" OR VALU$=OVAL$ THEN 40100:REM SKIP "VOWELS" AND "REPETITIONS"
40090 SNDEX$=SNDEX$+VALU$
40100 OVAL$=VALU$
40110 NEXT I
40120 SNDEX$=LEFT$(SNDEX$+"000",4):REM TRUNCATE/PAD WITH TRAILING 0S
40130 RETURN
41000 REM RETURN VAL$ FOR GIVEN C$ + CHECK FOR ILLEGAL LETTERS
41010 FOR VALU=0 TO 6
41020 CHS$=GROUP$(VALU)
41030 FOR J=1 TO LEN(CHS$)
41040 IF C$=MID$(CHS$,J,1) THEN VALU$=CHR$(ASC("0")+VALU):RETURN
41050 NEXT J
41060 NEXT VALU
41070 PRINT"ILLEGAL LETTER: ";C$:STOP
```

Fig 6 Soundex routine

Functional C

Les Hampson reveals everything you need to know about C functions, from basic patterns to changing variables.

Functions in C are comparable with the procedures of Pascal, or with the built-in functions of Basic like mid\$, sin, and inkey\$, except that you can write your own of any complexity to add to those provided. The most used functions, for example for file and display access, are supplied in a library with the compiler.

A simple function called 'spaces' to blank part of a line on a display is illustrated in Fig 1. Once this has been defined, it can be used anywhere in a program simply by calling it by name with the number of spaces required: for example, spaces (10).

Only one value is passed to this function, but others might accept none or a list of arguments. One function can call others which can call others, and so on; the example calls a standard library function, putchar, to display each space. A function can also return a value which can then be assigned to a variable or used in any other way. The standard library function, getchar, returns a character entered at the keyboard: for example, c=getchar().

Of course, a returned value can be ignored if it suits your purpose, and you might use the statement getchar (); so that the user presses a key before a program continues.

Advising on how large functions should be might seem like discussing the length of pieces of string, since clearly they can be as short, or long, as the job requires. But a rule which works well in practice is that functions should be less than 60 lines. This arbitrary limit means that each function will fit a sheet of print-out and read as a whole. In fact, many functions will be short enough to fit on a display screen. If you produce a program with a massive main function, then you should probably reconsider how it is structured. It's perfectly reasonable to have a main function of only a few lines which just controls the principle parts of a program.

Basic pattern

The basic pattern for a function is:

```
type function-name
(list-of-argument-names)
argument-declarations
{
  local-data-declarations
  statements
  return value
}
```

The only restriction is that one function cannot be defined inside another, so local procedures cannot be used. The only essentials are the name, the following brackets and the braces,

giving something which would do nothing. For example:

```
myfun ()
{
}
```

A rather artificial function with all the components is shown in Fig 2.

The type of a function is the type of the value returned and can be left out if it does not return anything. The type can be int, long, double, and so on, although int can be omitted as it's the default.

The name of the function is followed by a list of names which will be used *internally* to refer to the arguments passed to it. The types of these arguments are declared followed by the body of the function, which is enclosed in braces. Local data is declared before any statements and, unless this is specified as static, it disappears on finally leaving the function. After executing the statements, a function is exited either by reaching the final brace, or by a return statement which can be followed by a value to send back.

Data

A function is called by name with a list of values to be passed in brackets; these can be variables or constants. For example:

```
square (z);
sqrt (3.6);
putchar ('A');
puts ("Your message could go here");
strcmp (str, "testing");
```

Only the values of arguments are passed and made available to the called function. This means that a function can modify the values in any way required, for example as a decreasing loop counter, and will not affect variables in the calling function. A called function simply copies the values and makes them available as values in local variables, with their own names.

This is an important point which affects how C functions manipulate data. You might wonder about character strings and other arrays since there is no obvious value. These are treated somewhat differently with the address in memory being passed, but this is best considered as the mysteries of pointers unfold.

As well as its type, every variable has an associated storage class which determines how it will be kept in memory. Local data is available within the function in which it is defined and

```
spaces(number)
int number;
{
  while(number-- !=0)          /*loop until counter is zero*/
    putchar(' ');
}
```

Fig 1 Function to display spaces

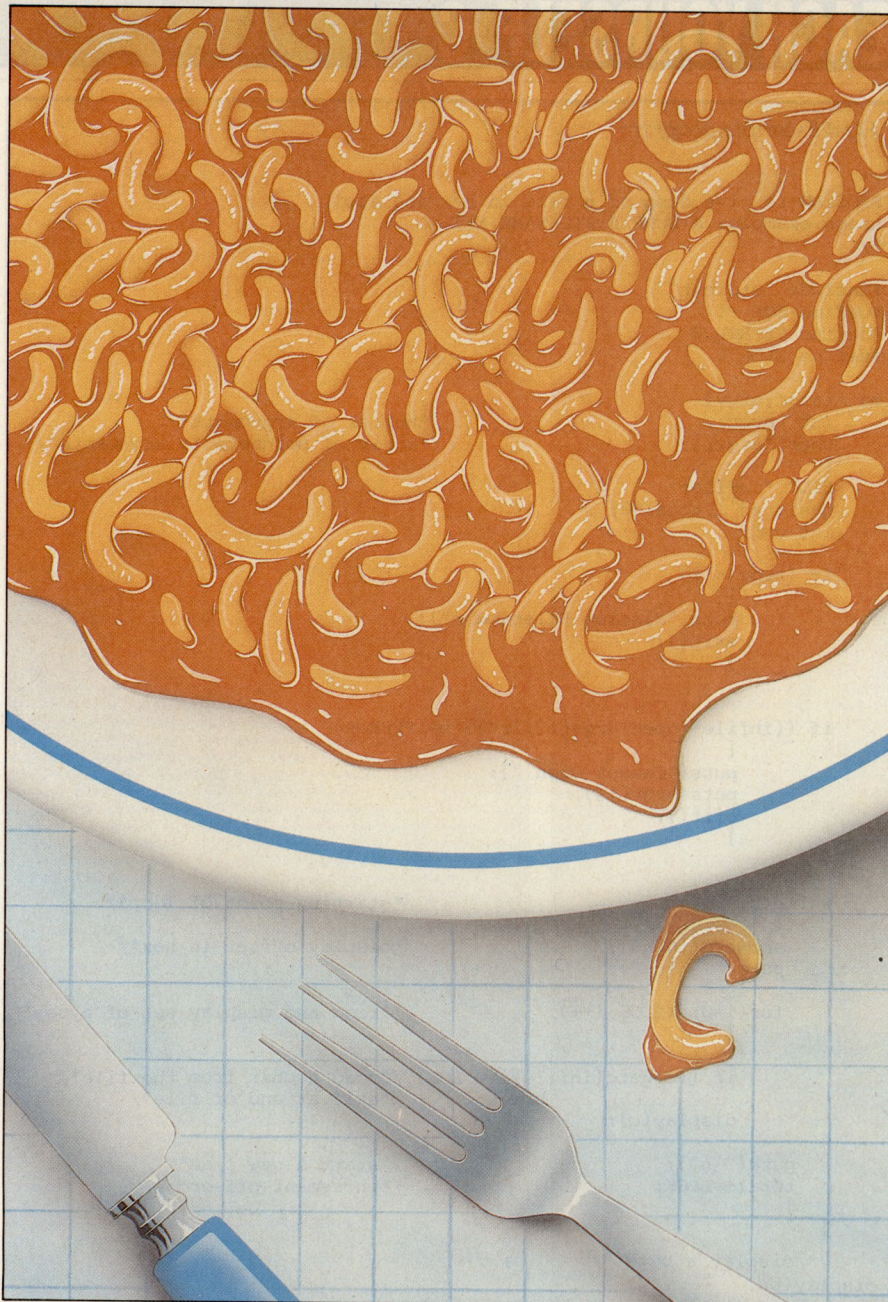
```
double square(x)              /*type specifies double returned*/
double x;                     /*declare argument passed*/
{
  double result;              /*local variable*/
  result=x*x;                  /*calculate result*/
  return result;              /*return result*/
}
```

Fig 2 Specimen function

```
range(x)
unsigned x;
{
  int rval=2;                 /* for values >= 32768 */

  if(x<256) rval=0;
  else if(x<32768) rval=1;
  return rval;
}
```

Fig 3 Returning values



nowhere else — not even in other functions called from it. The default for local data is `auto`, which means that the memory is released and the value lost when the function is finally left. When you need to retain a value for the next time a function is called, this can be done by using the specifier `static`. You might also use this to retain a count of how many times a function has been called.

Another alternative is to specify a local variable as a register to indicate that it will be very frequently used, perhaps as a loop counter. Many micro versions of C ignore this hint to store it in one of the registers because of the limited number available.

A single value can be sent back to the calling function by a return statement. This can use a variable or constant, or can involve an expression which is first evaluated. For example:

```
return 0;
return x;
return (x>y)? x:0;
```

Return statements can occur anywhere in the body of a function. Since they disrupt the logical structure, it's best to use a local variable called, say, `rval`, which is sent back by a single statement as in Fig 3.

A function call 'leaves behind' its returned value, just as an expression does when evaluated. This means that a function call can be used anywhere a value is acceptable: in an assignment, as part of a complex expression or comparison, or as an argument for another function call. Consequently, it is inevitable that only one value can be returned. You could use:

```
x=sqrt(3.6);
x=sqrt(sin(3.6));
if(getchar()=='a')
x=rand();
```

If a function returns a type other than `int`, then this must be specifically declared before it is used. This is done in a similar way to a data declaration, except that the function name is given with empty brackets. The declaration

must correspond to the type specified in the function definition. It is usually convenient to declare all the functions which return non-integers at the start of a source file, so that they are known throughout. For example, the standard maths functions return a double, so must be declared before use:

```
double sqrt(); /*square root
function*/
double y,x=0.7;
y=sqrt(x);
```

Since the type `char` is converted to `int` in expressions and all floating point operations are in double precision, the types used for function declarations need only be `int`, `long`, `double`, or a pointer. The default is `int` so does not have to be declared and often isn't, although it's good practice to do so.

There must be the expected number of arguments passed to a function and these must be of the expected type and in the correct order; for library functions the requirements will be described in the reference manual. Sometimes we want to use an 'incorrect' type and so must massage the value of our data into the required type using a cast, which is simply a type name in brackets:

```
int x=8;
double sqrt(),y;
y=sqrt((double)x); /*force value of x
to double*/
```

If a function requires a long argument and you want to use a constant, use the `L` suffix as in:

```
lseek(myfile,256L,0);
```

The function `lseek` is in most libraries and adjusts the position in a file, where the next data will be accessed to give random access. The second argument needs to be a long because it determines the position, and files can be bigger than allowed by an unsigned value.

The C compiler will give no protection against errors involving data types. The program will usually carry on regardless, so if a function expects a double then it assumes one has been provided and will grab what it can from the expected place in memory. If you used `sqrt(x)`, in the example above, then the answer would be meaningless.

The stack

It is useful to have some insight into the mechanics of calling a function, especially how the stack is used. This is simply an expandable area of memory, where values can be added to the top and taken off as required; the size goes up and down as the stack is used. A good analogy is a pile of paper on a spike. When a function is called, the normal process is for the arguments to be placed on the stack, right-most first, then information on how to return, and finally, any space required for local auto variables is allocated. All of this section of the stack is moved on, leaving the function to restore the initial condition. Special arrangements are sometimes made for floating point arguments.

Static variables are not held on the stack but in an area of the memory reserved for permanent data. The compiler ensures that these variables are only accessible from within their functions and that there is no conflict over names.

When values are returned, they are placed in a consistent way according to their type: for example, in one or more registers. The returned type must be declared so that the value can be correctly accessed.

Any function can call itself without conflict of argument or local variables. All that happens is that a new section of the stack is allocated for each call. If this continues, then eventually there will be no memory available and the program must abort. Recursion can lead to very succinct programs, especially when using data structures like linked lists.

There is a standard library function, (printf), to display all kinds of formatted output, but as an example we can write a recursive function to display a decimal number. This can't be done directly, since the first character to display is the last available as we repeatedly divide by 10:

```
numsho (num)
{
    unsigned num;
    {
        unsigned quot,rem;

        quot=num/10;
        rem=num%10;
        if(quot!=0) numsho (quot);
        /*recursion until no remainder*/
        putchar (rem+'0');
    }
}
```

The function putchar accepts an argument which is the ASCII value of a character to be displayed. So to use it to display a digit, we need to add the value of rem to '0'.

Changing variables

Any function can make changes to global data items since these are accessible by name. Some global data, needed by many functions, will be used in most programs and this is preferable to long lists of arguments. However, in general, values should be passed between functions using arguments and a returned value, and local variables used. In most versions of Basic, all variables are global; a common problem is that a change to a variable in one part of a program has unexpected side effects on another.

A function cannot directly change local variables in another function, including the one which called it, nor can it return several values. However, we often want to do just that. For example, you might want a function to exchange the values in two integers but cannot use exchange (x,y) /*this does nothing*/
int x,y;

Fig 4 Example program

```
/*
PROGRAM to give dump of a file in hex and ascii
usage example: A>DUMP B:FILENAME.EXT
*/

#include "stdio.h"
#define EOF -1
#define FERROR 0
#define BLOK 8

main(argc,argv)
{
    int  argc; /*number of arguments*/
    char *argv[]; /*array of pointers to arguments*/
    FILE *infile;
    unsigned i,total=0;
    int c=0;

    if (argc < 2)
    {
        puts("Missing Filename\n");
        exit();
    }

    if ((infile=fopen(argv[1],"r")) == FERROR)
    {
        puts("Cannot Open ");
        puts(argv[1]);
        exit();
    }

    while(c!=EOF) /*starting point of loop*/
    {
        showord(total); /*display offset in hex*/
        puts(" ");

        for(i=0;i<BLOK;i++) /*read and display set of bytes*/
        {
            if ((c=getc(infile))== EOF) /*read a char from the file*/
                break; /*exit at end of file*/

            display(c);
        }
        puts("\n"); /*start a new line*/
        total+=BLOK; /*increment offset*/
    }

    /* display a byte */
    display(ch)
    char ch;
    {
        shobyte(ch); /*display char in hex*/
        putchar(' ');

        if(ch>=' ' && ch<='~') /*is char printable*/
            putchar(ch); /*then display it*/
        else
            putchar(' '); /*otherwise a space*/

        putchar(' ');
    }

    /* print a word in hex */
    showord(wrd)
    unsigned wrd;
    {
        shobyte(wrd>>8); /*display high byte*/
        shobyte(wrd); /*and low byte*/
    }

    /* print a byte in hex */
    shobyte(byt)
    char byt;
    {
        shonib(byt>>4); /* two hex chars needed for byte */
        shonib(byt);
    }

    /* print a nibble as a hex character 0-9 A-E */
    shonib(nib)
    char nib;
```

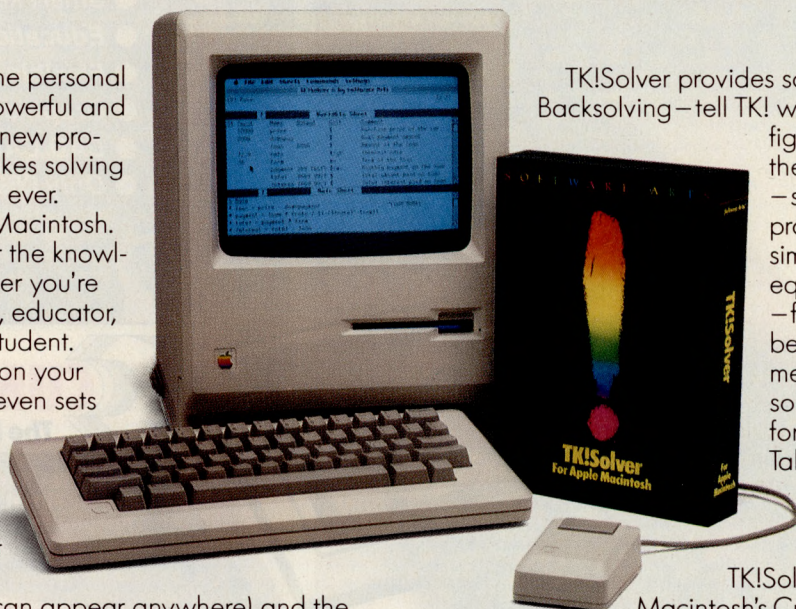
(continued page 171)

MAKE SHORT WORK OF LONG EQUATIONS

**Introducing TK!Solver[®] for Apple[®] Macintosh[™].
An equation processing program that helps students and
professionals solve even their most difficult problems.**

For those who own the personal computer that's so powerful and easy to use, here's a new productivity tool that makes solving problems easier than ever. TK!Solver for Apple Macintosh. The complete tool for the knowledge worker—whether you're an engineer, scientist, educator, financial analyst or student.

Let TK!Solver take on your toughest problems—even sets of simultaneous non-linear equations. No matter how you're used to solving problems, just enter the equations (unknown variables can appear anywhere) and the known values. And click. You have the solution quickly. Without programming.



TK!Solver provides sophisticated features like Backsolving—tell TK! what you know, and it

figures out the way to solve the problem. Iterative Solving—successfully attack even problems involving sets of simultaneous non-linear equations. Unit Conversions—for automatic conversions between different units of measurement. List Solving—solving a model repeatedly for lists of input values.

Tables and High Resolution Plots—produce plots using symbols, lines or a combination of both.

TK!Solver takes full advantage of Macintosh's Cutting and Pasting, Pull-Down Menus, High Resolution Graphics, and also provides a friendly Help and Error Diagnosis System.

TK!Solver[®]
By Software Arts[™]

Cumana, now the best name in sight.



Cumana, the best name in memory for a range of disk drives, now introduce the first of a new range of computer products. A low cost and fully guaranteed graphic plotting aid for the BBC Micro. This compact display cursor moving device simplifies programming with the touch of the stylus. The product comes complete with a programming instruction booklet and has uses in graphics, computer aided design, education and games.

- Mouse substitute
- Smart keyboard supplement
- Education
- Flexible numeric keypad
- Graphic input device
- CAD/CAM system
- Only £69.95 inc. V.A.T.



Cumana Limited, Pines Trading Estate,
Broad Street, Guildford, Surrey, GU3 3BH.
Telephone: Guildford (0483) 503121
Telex: 859380

TEACH YOURSELF C

```
{
nib&=15;
putchar((nib >= 10) ? nib-10+'A': nib+'0');
}
```

/* Sample output

```
0000 0D 0A 2F / 2A * 0D 0A 50 P 52 R
0008 4F O 47 G 52 R 41 A 4D M 20 74 t 6F o
0010 20 67 g 69 i 76 v 65 e 20 64 d 75 u
0018 6D m 70 p 20 6F o 66 f 20 61 a 20
0020 66 f 69 i 6C l 65 e 20 69 i 6E n 20
0028 68 h 65 e 78 x 20 61 a 6E n 64 d 20
```

Library functions used

```
fopen      open a file for reading or writing
getc       get next character from a file
putchar    display a character
puts       display a string
exit       exit program
*/
```

/*open file for reading*/

```
{
int temp;
```

```
temp=x;
x=y;
y=temp;
}
```

This will have no effect on the original variables because only their values are passed as arguments. What is needed is to pass values which enable the required variables to be accessed, specifi-

cally their addresses in memory. This leads us into the use of pointers which will be considered next month.

Main function

Every program must have a function called main where execution begins. This can have arguments which are provided, not by another function, but by the call to the program. For example, if a program is invoked by entering myprog arg1 arg2, then the two

arguments, and in Unix the program name, are available to main. By convention the arguments are declared as follows:

```
main (argc,argv)
int argc; /*the number of
arguments*/
char *argv[]; /*array of pointers
to strings*/
```

You will be able to access the command line arguments after getting to grips with pointers. Since they are local to main, they have to be made available to other functions by passing their values or copying to global variables.

As well as learning C by writing simple programs and trying them out, it is also useful to see examples from other programmers. The program in Fig 4 illustrates some of the features of C which have been described and it might even be useful. The file name is passed to the program as an argument and is available as argv[1]. **END**

This is part three of a five-part Teach Yourself series. Back issues can be obtained from our office at 53 Frith Street, London W1A 2HG, tel: (01) 439 4242.

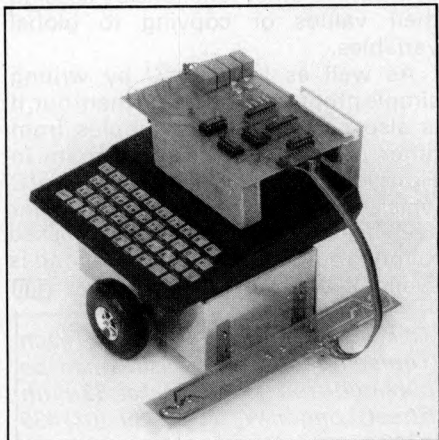
To help you get the best from the Teach Yourself C series, PCW has arranged special discounts on several C packages. Identify your machine or operating system from the list below and send the offer tab on the corner of this page with your order to the appropriate address. Enclose a cheque for the full amount, and make sure you state clearly which package you require. This list is not comprehensive. Other suppliers such as Conquin Software and Grey Matter are worth contacting for their prices. Conquin is at 14 Goodwood Close, Morden, Surrey and Grey Matter at 4 Prigg Meadow, Ashburton, Devon.

Company/Address	Machine/Operating System	Package	Price (includes VAT and UK p&p)
Hisoft 180 High Street North Dunstable, Beds	Spectrum	Hisoft C	£22.50 (normal price £25)
System Science 6-7 West Smithfield London EC1	CP/M-80	Software Toolworks C80, Mathpak and C Programming Language by Kernighan and Ritchie	£90 (normal price £119.15)
	CP/M-80, MS-DOS	DeSmet C and C Programming Language	£155 (normal price £185.40)
	Apple DOS 3.0 or Prodos	Aztec C86 Compiler and C Programming Language Aztec C Compiler and C Programming Language	£190 (normal price £255.40) £165 (normal price £220.90)
MLH Technology 14 Burgamot Lane Comberbach, Cheshire	CP/M-86, versions 1 and 2 of MS-DOS and PC-DOS	DeSmet C without debugger	£130 (normal price £158.75)
		DeSmet C with debugger	£181.75 (normal price £216.25)
		BDSC	£118.50 (normal price £176)
MMG Consultants 19 St Andrews Road Great Malvern, Worcs	CP/M	Small C-80	£75 (normal price £110.98)

**C
DISCOUNT
VOUCHER**

Trundle along

There must be tens of thousands of ZX81's gathering dust on shelves, as their owners have graduated to bigger machines. Robin Moorshead and Eddie Forrester give new life to the ZX81 — reborn as Trundle.



We set out to make a simple 'robot' that would solve a problem; to find its way through a twisted passage-way with blind alleys, reach an end goal, and know it was there. The programming is not too difficult, it can all be done in Basic (2k of RAM has been fitted to allow even poorly structured programs to fit in). Undoubtedly you could write a machine code program in the ZX81's original 500 bytes, but it wasn't built for experts, it was built for beginners. To see the 'robot' in action tune into 4 *Computer Buffs* on Channel 4. (See 'Light Fantastic' page 184 for further details.)

The Trundle package consists of an interface and memory expansion board for the ZX81 and the extra pieces necessary to make a ZX81 based 'Trundle' robot. The system is supplied in kit form with a comprehensive set of instructions.

The package itself breaks down into four main sections: the interface, the memory expansion, the sensor board, the motor/chassis unit.

The interface

This provides eight input lines and eight output lines, the latter being buffered by relays to enable the direct control of small motors, buzzers and so on (Fig 1).

Data is latched onto the output lines by the command: POKE 9000, data.

The data is presented on the output lines in its binary form for example: If data = 1 then only the relay for bit 1 is energised. If data = 5 then the relays for bits 1 and 4 are energised.

The interface is memory mapped and may be addressed between 8-16k or 40-48k although address 9000 is usually used for convenience. This area was chosen since it is unused by the ZX81 operating system. The area is not however clear, containing a ROM shadow. If this shadow were to be left, the operation of the interface would be corrupted. For this reason, ROMCS is connected to A13 through a diode D9 so that it is pulled high, if any address containing A13 appears on the address bus (as at any address in the 8-16k ROM shadow). This disables the ROM when necessary without affecting the normal operation of the ZX81.

The output of IC3a will only go high if the computer is writing to memory (MREQ and WR low) in ROM or ROM shadow areas (A14 low). This signal is then 'ANDed' with A13 to ensure that the computer is not trying to communicate with ROM and this output (from IC4b) used to take the 'E' pin of IC6 high. This prepares IC6, an octal latch, for data transfer. When MREQ goes high again, the 'E' pin is taken low, the new data being latched onto the output lines on the falling edge. These lines are then used to drive the relays through TR's 1 to 7. The diodes across the relay coils protect the transistors from the back EMF spikes that occur when the relays are de-energised.

The select circuitry for the input port is essentially the same as for the output port differing only in that it provides an active LOW output when the computer wants to READ data. This output is used to enable IC5 (an octal buffer) which effectively connects the input lines directly to the ZX81's data bus.

IC's 7 and 8 are Schmitt inverters and serve to square up the input signal.

Memory expansion

Although the standard 1k ZX81 does not provide enough memory for any but the simplest of interfacing programs, the extra cost and power consumption of a 16k RAM pack are not worth while. Instead, this package contains a CMOS memory board which provides extra memory whilst actually lowering the power consumption of the ZX81. The memory board also serves to

connect the ZX81 to the interface board.

IC2 is a 6116, 2k x 8 CMOS RAM. It is selected when both A14 and MREQ are low simultaneously. This decoding is essentially the same as that performed in the ZX81's ULA which normally selects the RAM when required. However, the RAMCS line cannot be used as it must be pulled high permanently to disable the internal RAM.

Trundle bits

In this category fall, all the extra bits necessary to make a ZX81 based 'Trundle' robot which is designed to negotiate a twisting passageway defined by black lines. A sensor board and chassis are supplied in kit form.

The design of the sensor board is simplicity itself, Fig 4. When Infra-red from one of the TIL38 IR transmitting diodes is reflected into one of the photo-transistors, its collector/emitter resistance falls dramatically, pulling the appropriate input line to 0V. When no IR is detected the resistance of the collector/emitter junction becomes extremely large and the input of the port is effectively left floating high. As the signals are inverted by the Schmitt triggers in the interface, a high will appear on the appropriate data line when IR is detected and a low when none is perceived.

The photo-transistors are arranged so that they may provide an indication of Trundle's orientation in a passage-way, where there are walls. Fig 6.

The chassis and motors are also supplied in kit form but the instructions make assembly an easy task. The motors are switched by the relays in the interface. See Fig. 7.

Construction

Provided you take care and obey a few simple rules, your circuits will work first time. Too much haste or carelessness inevitably leads to disappointment.

1. It is critical which way round most components are connected. With semi-conductors, if you switch them on connected the wrong way round, you will not get a second chance; they are destroyed in a few millionths of a second. The legend on the printed circuit board will tell you the way the components should be connected.

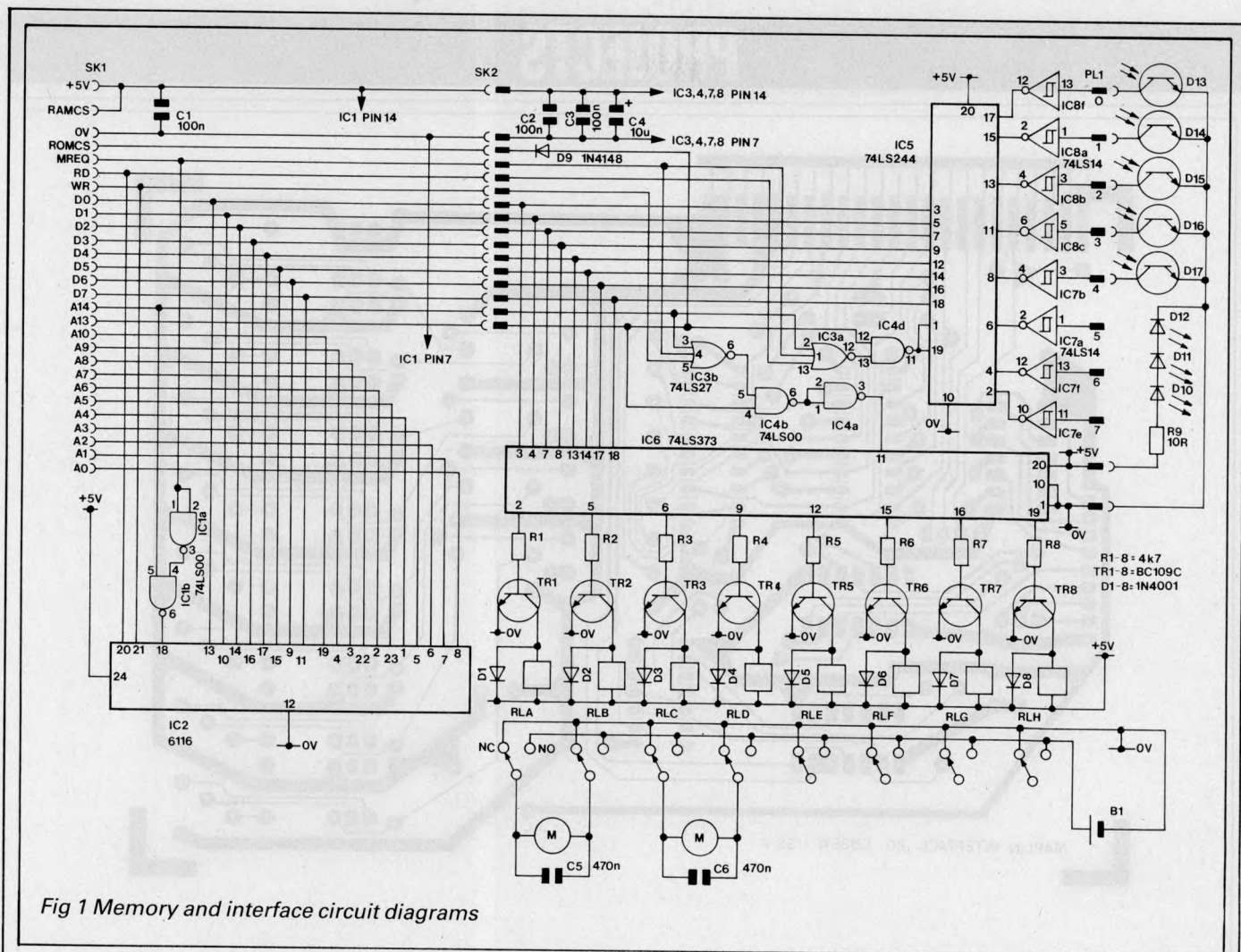


Fig 1 Memory and interface circuit diagrams

The microchips have a 'U' shaped slot in the plastic package. This aligns with the 'V' shaped slot in the socket. The transistors have a tag on the case. The diodes D1 to D4, and D9, have a thick band at one end. The diodes D10 to D12 have the anode lead longer, and D13 to D17 have the anode (collector) lead shorter. The capacitor has a + sign by one lead.

2. Use a miniature soldering iron. When it has heated up, wipe the hot tip

on a piece of wet sponge to clean it. Do this regularly to remove excess solder and flux. Hold the soldering iron so that it touches both the copper track and the component lead and after a few seconds apply solder to produce a 'volcano' shaped joint.

Sensor Board

Solder the 10Ω resistor in position (Fig 5). The infra-red detector transistors can

be identified as they are transparent and smaller than the emitters.

Insert the transistor into its holes, making sure the emitter and collector are the right way round. Hold the transistor so that it stands 9mm proud of the board and solder it in place (Fig 8). Repeat the process for the other four transistors. Do not clip off these leads.

Now solder in the emitter diodes, noting that the longer lead goes to the 'A' sign. Position them so they are level

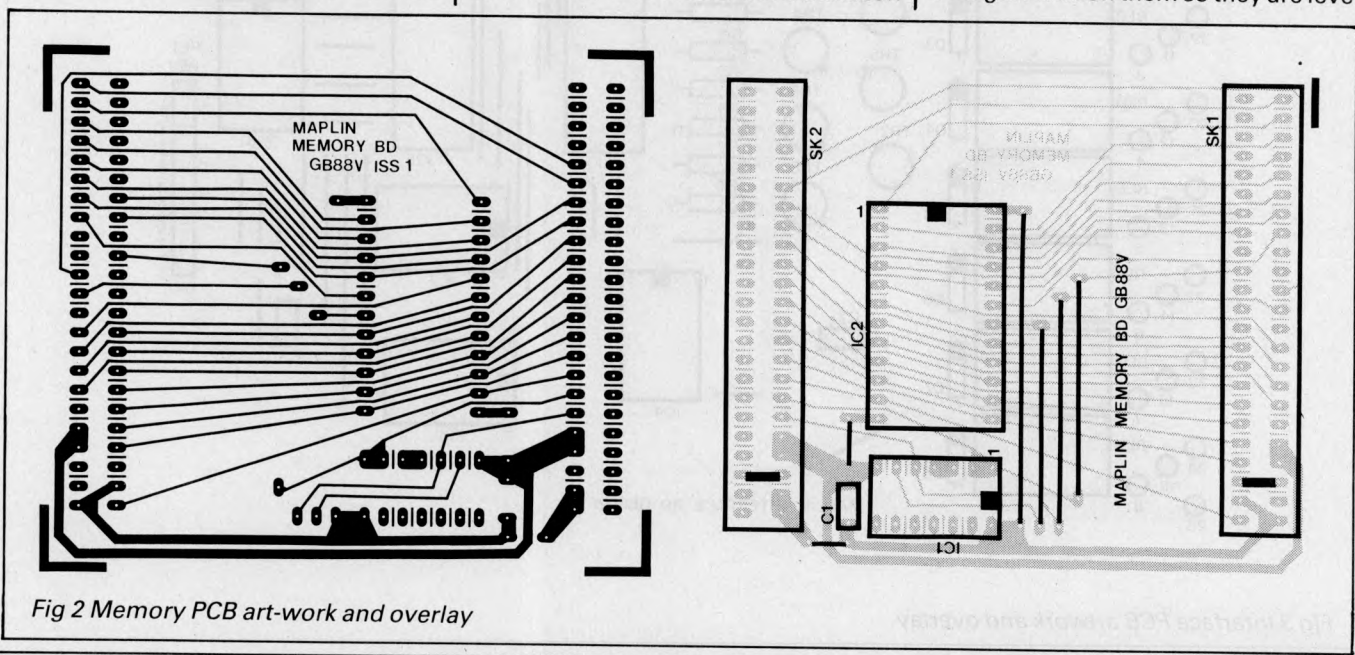


Fig 2 Memory PCB art-work and overlay

PROJECTS

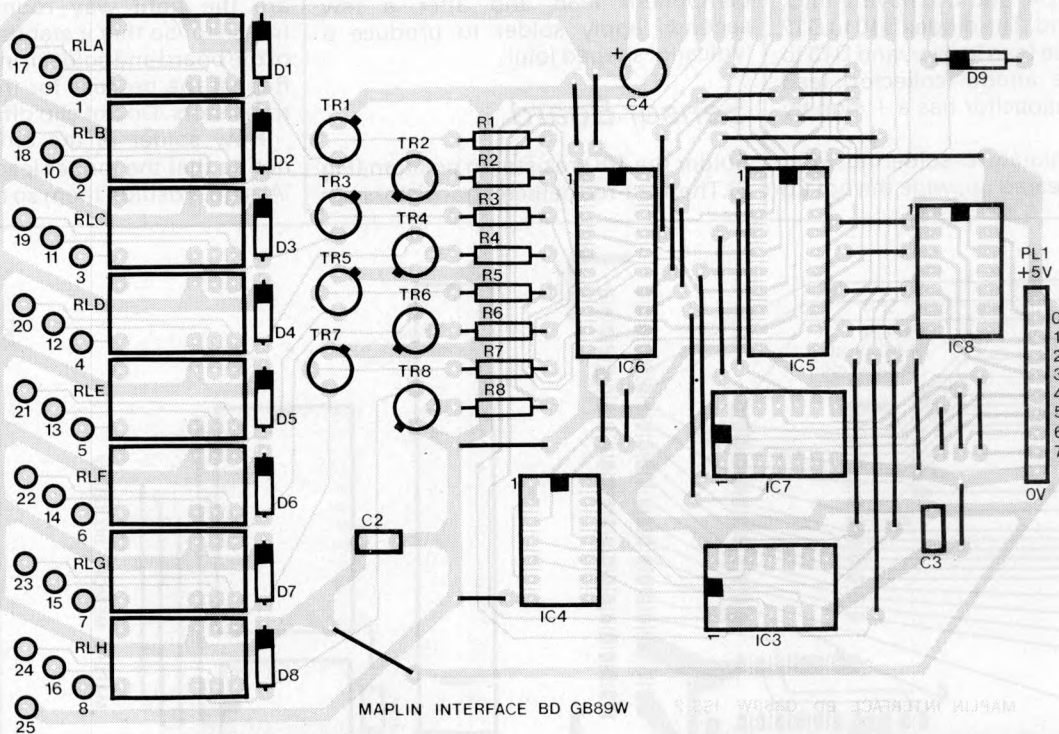
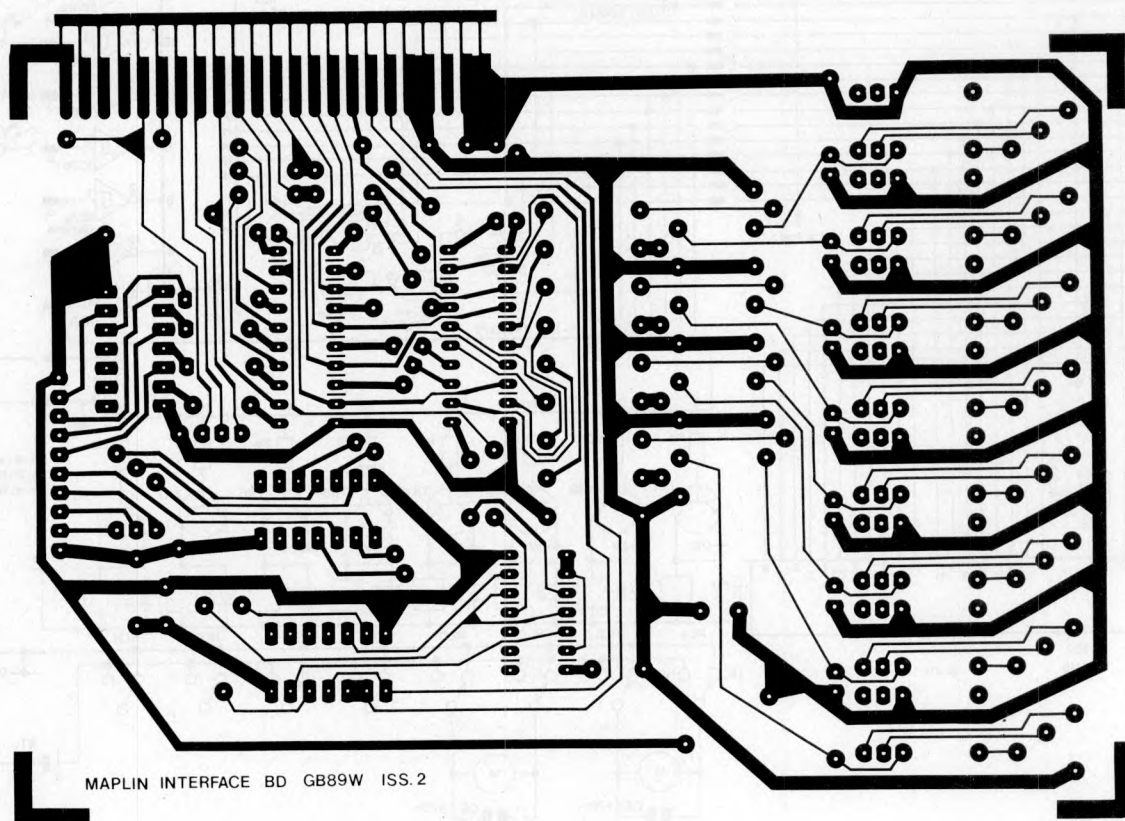


Fig 3 Interface PCB artwork and overlay

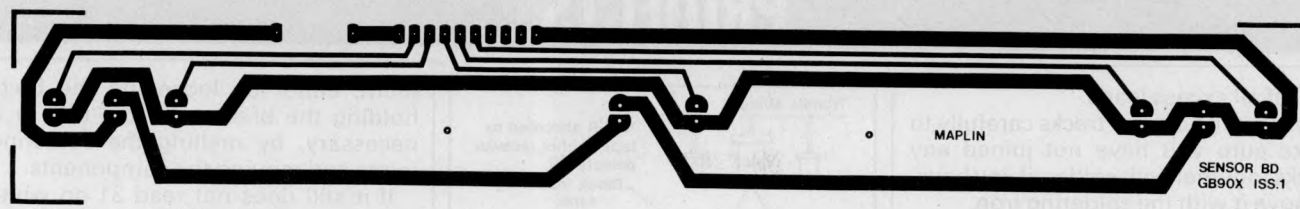


Fig 4 Sensor PCB art-work

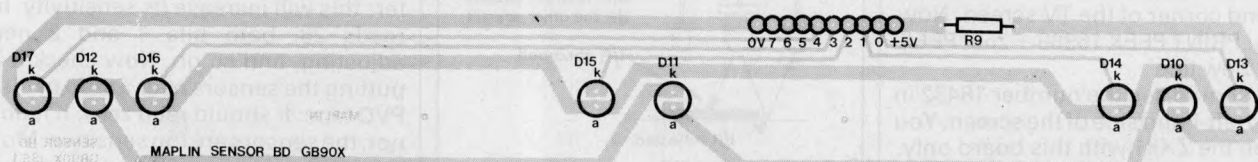


Fig 5 Sensor PCB overlay

with the transistors, (Fig 9). Again, do not clip off the leads.

Cut a 22cm length of ribbon cable and strip off the white, grey and violet leads, leaving a 7-way cable. With a sharp knife, separate the leads from one another for a length of about 1cm at both ends. Remove the insulation from each wire for a length of about 2mm. Make sure the wire strands are tightly bunched together and solder one end to the 'minicon' terminals. You can then push the terminals into the 10-way housing (Fig 10). Do take great care when doing this work as odd straggling wires will cause shorts.

Take the 10 μ F tantalum capacitor and note that the longer lead is marked +. Offer the capacitor into position C4 with the + mark on the capacitor adjacent to the + mark on the board, and solder into place. Trim off surplus leads. The two 0.1 μ F capacitors, C2 and C3, can be put in either way round. Solder into place and trim off the surplus leads.

Take 13 of the Vero-pins and push them firmly through the holes P1 to P4, P9 to P12, P17 to P20, and P25 from the copper track side of the board until the collar touches the track. Solder them into place.

With the strapping wire, link pins P17 to P20 inclusive, and P25. Separately link pins P9 to P12. Take 30cm of ribbon cable, remove the blue, violet, grey and white wires; strip off 2mm of sleeving from each of the wires and separate them from each other for a distance of 2cm at one end. Attach this end to the board (Fig 11).

Carefully press the IC's into their sockets. Check to see the legs all rest in their socket holes and if they do, firmly press the IC home. Now check what you have done. Inspect the copper tracks carefully to make sure you have not joined any tracks with solder. Check again that all the transistors, diodes and IC's are the right way round.

Chassis and Motors

Drill and cut the two parts of the box

which will form the chassis (Fig 12). You should take particular care when drilling the holes for mounting the motors and sensor board as misalignment here could cause the device to perform poorly.

Assemble the motors and gearboxes following the instructions enclosed in the motor kit. Use four of the black gears and four space washers. You will find the motor will enter its housing more easily if the plastic label is peeled off first. Be careful not to apply excessive pressure when assembling as this may crack the casing. Ensure that the gears all move freely and oil all the moving parts.

Place the main output shaft of the motor onto a vice or similarly hard object (Fig 13). Place the wheel in position and tap into place. Do not use excessive force or this may bend the output shaft or break the plastic casing.

Bolt the motors into place with 6BA nuts and bolts, making sure there is a washer on top of the plastic mounting flange. This will avoid the flange cracking when the bolts are tightened up. Do not use excessive pressure when tightening up as this could break the plastic casing.

Fix the 4BA bolts into place. These act as skids, stopping the chassis rocking backwards and forwards. Bolt the battery box to the chassis using four 6BA nuts, countersunk 1in screws, spacers and washers. The spacers fit between the battery box and chassis to allow cable access and room for the skid nut. Take the free end of the cable from the interface board and peel the green and black wires away from the other wires for a distance of 6cm. Peel the red and brown pair from the orange and yellow pair for a distance of 4cm. Separate the yellow from the orange and the red from the brown for a distance of 2cm. Solder the green wire to the negative (spring end) of the battery box and the black wire to the other end (positive). Solder a 0.4 μ F capacitor across the terminals of each motor; it doesn't matter which way

round they are fitted. Solder the yellow wire to the positive of the right hand motor; orange to the motor's negative tag; the brown wire to positive of the left hand motor and the red to the negative tag of same. (The positive is identified by a small + sign cast into the plastic.) Mount a U2 or HP2 battery in the battery holder with the positive pointing towards the left motor.

Attach the two brackets to the holes in the front with 6BA nuts and bolts. Bolt the sensor board onto the brackets with the track side up, with the cable leaving from the front of the board, and the bracket underneath the board (that is not on the track side Fig 15). Make sure the sensor board is level with the base of the box.

With the set of screws provided, screw the box together. The motor/chassis unit is now complete. Do not try pushing the unit forwards without power running through the motors or you may strip the teeth from the gears in the gearboxes.

The board is now finished. Check it carefully for solder joining tracks together. Also check that the components are inserted the right way round. The diodes and transistors have been left with long leads for final adjustments.

Memory Board

Solder in the six link wires and clip off the surplus leads. Solder in the IC sockets as before, ensuring they are pressed firmly home and the notch faces the same way as on the legend. Solder in the multi-way edge connectors so that the bar on the legend lines up with the locating peg in the socket. Solder in the 0.1 μ F capacitor C1; this may fit in either way around. Clip off the surplus leads.

Push the 74LS00 into its socket. The 6116 memory chip is sensitive to static electricity so precautions should be taken when fitting it. Always leave it in its box until required. Touch an earth if possible; then touching the pins as little as possible, plug the IC into its socket.

Cut off all excess leads.

Inspect the copper tracks carefully to make sure you have not joined any tracks together with solder; if you have, remove it with the soldering iron.

You can now test the board. Plug it into the back of the ZX81 pushing it home firmly. Switch the computer on; you should see a 'K' in the bottom left-hand corner of the TV screen. Now type in: PRINT PEEK 16388 + 256*PEEK 16389 'new line'.

You should see the number 18432 in the top left-hand side of the screen. You can use the ZX81 with this board only, plugged in like this as the available memory is now nearly doubled.

Main Interface Board

Note that there are no components for relays RLE-RLH, transistors TR5-TR8, resistors R5-R8 or diodes D5-D8. This is because the interface board has been designed to be able to cope with future developments.

First install the link wires. Cut each wire about 8mm longer than the distance between the holes (marked with a bar on the board). Bend the bare ends at right angles to the length of the wire; offer these ends through the holes and solder into place. Trim off any surplus wire above the solder.

Now solder in the six sockets. Note that they have a 'V' shaped notch at one end. This is to help orientate the chips the right way around. Solder in the 10-way 'minicron' plug assembly with the long shafts pointing out from the board. Take one of the BC109 transistors and note the tag which identifies the emitter. Push the transistor TR1 into its holes and solder into place. Trim off the surplus leads. Repeat the process for TR2 to TR4.

Take one of the 1N4001 diodes and note the silver band which identifies the cathode. Repeat the process for the other 1N4001's. Now fit D9 with the thick band on the diode lining up with the thick band on the legend. Solder in place and trim off the surplus leads.

Solder the resistors into positions R1 to R4, and trim off the surplus leads. These may fit either way round, but it looks neater if they are all the same way.

Carefully offer the relay into position RLA pushing it firmly home, and solder it into place. Repeat the process for RLB to RLD.

Assembly and Testing

Take a piece of wood 10mm thick (approximately) by 4cm by 10cm. Push the main interface board into the memory board and the memory board into the back of the computer.

Support the interface board by putting four sticky pads along the long narrow edge of the piece of wood, two on the bottom and two on the top. Place

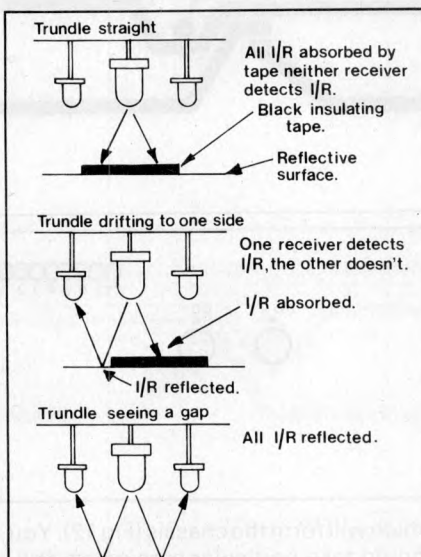


Fig 6 Infra-red detection principle

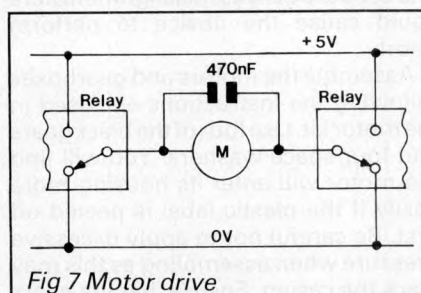


Fig 7 Motor drive

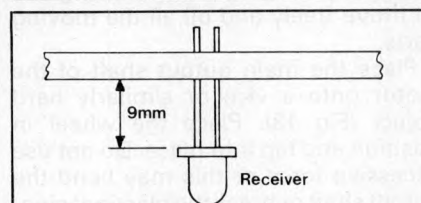


Fig 8 Mounting infra-red detectors

four Quickstick pads onto the top of the aluminium box and stick the computer to the top of the box with the keyboard facing to the right-hand side. To keep the device balanced allow the keyboard to overhang by about 5cm (Fig 16). Plug in the sensor board connector. The black wire should be nearest the memory board.

Support the chassis so both wheels are off the ground. Switch the computer on and type in POKE 9000,10 and press NEW LINE. The two wheels should rotate forwards. Now type in POKE 9000,5 and they will both reverse. Now place the device with the sensor board over a white sheet of paper. Switch the computer on and type in 10 PRINT PEEK 9000 20 SCROLL 30 GOTO 10

If the sensor board is reading properly, there should be a series of 31's moving up the left-hand side of the screen. If not adjustments will have to be made. Firstly check the transmitter and receivers are between 2 and 3mm above the paper. If they are not adjust

them, either by loosening the bolts holding the brackets to the box or if necessary, by melting the soldering joints and moving the components.

If it still does not read 31 on white paper you can tell which sensors are not receiving (Fig 17). If for example it reads 27, bit 4 needs adjusting. Bend the transistor gently towards the transmitter; this will increase its sensitivity. If it reads 28, both bits 1 and 2 need adjusting, and so on. Now check it by putting the sensors over a strip of black PVC tape. It should read zero; if it does not, the sensors are too sensitive. Move the appropriate receiver away from its transmitter a little. Re-check it over white paper again.

To use Trundle, you will need a problem for it to solve. The passage it travels along should be made of black 3/4 inch PVC tape on a white surface. We used an 8 x 4ft sheet of melamine covered chip board, but white-coated or painted hardboard would do. If you could find a large sheet of paper, even that will do but make sure it lays absolutely flat. Mark out your passage carefully in pencil first so the inside edges are 16cm apart. When you stick down the tape, don't stretch it or it will creep out of place. You should include left and right turns and dead ends as well as the end goal. An approximate diagram of our original passage-way is shown in Fig 18.

In the test procedure 'POKE 9000,10' turned on the motors, both going forwards, and 'POKE 9000,0' turned them both off. The rest of the POKE commands are:

Number Poked to 9000	Result
0	Stop
8	Correct left drift
2	Correct right drift
6	Left turn
9	Right turn
6 & 9 also perform about turns	
10	Forward
5	Reverse

(Any other number poked to 9000 may activate the motors but not necessarily producing a useful movement.)

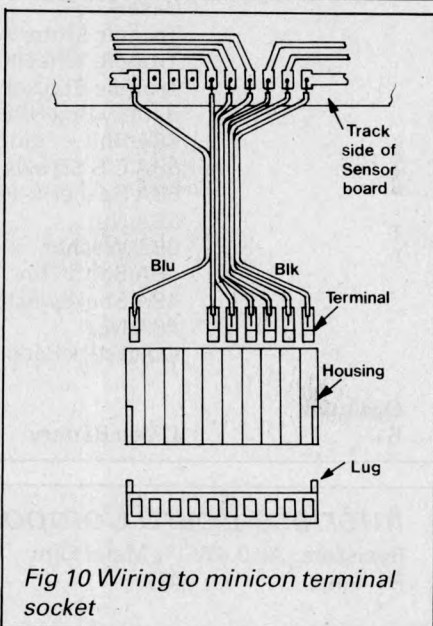
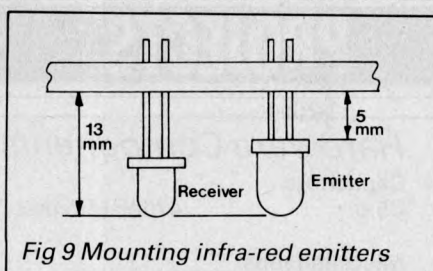
Place Trundle on a piece of white paper onto which two strips of black PVC tape have been placed 16cm apart. Type in:
10 PRINT PEEK 9000
20 SCROLL
30 GOTO 10
'NEW LINE'

With the outer sensors directly over the black lines, you should see a series of 4s moving up the left-hand side of the screen. If not, move it gently from side to side until you do see 4s. If you cannot achieve a 4, go back to the adjustment section and adjust the diodes for bits 1,

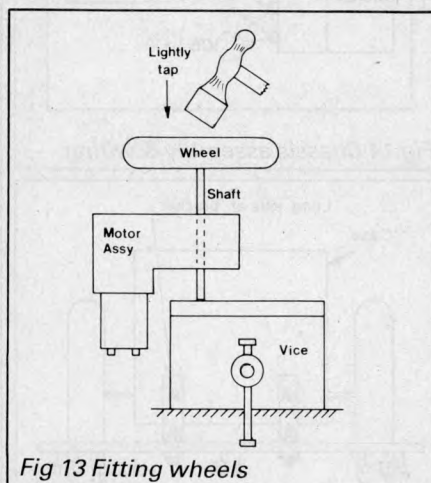
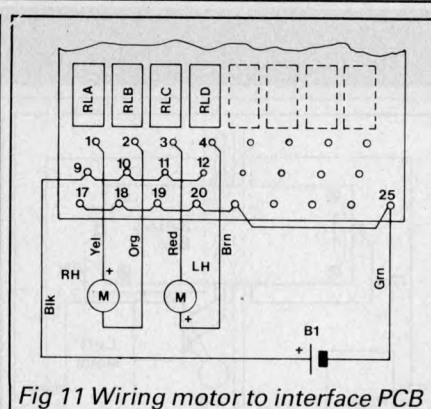
If there was only a tape on the right (from Trundle's point of view) Bits 4, 2 and 1 would be activated, so you should read 7. Likewise, if there was only tape on the left, you would read 28 ($16 + 8 + 4$). Move Trundle about gently and try these.

You will need to know what the readings are if it drifts off the straight path. Since these will vary from one Trundle to another, you will have to find these out for yourself. Place Trundle between the two lines so it is reading 4. Now gently push it to the left; the 4 will change (to either 5 or 12). Now push it further, recording all the new numbers until it reaches 31. Repeat the procedure for right drifting and record your results. Make all your readings into a chart, thus:

Reading	Meaning
4	Going straight between two lines
31	No lines (coming out of a 'T' junction)
0	Line under all sensors (at the end of a dead end)
7	Only line to the left
6	Line to the left and Trundle drifting to the left
5	Line to the left and Trundle drifting to the right and so on...



Trundle has achieved its goal if it reads 27, since this is the only time 4 would be de-activated while the others



are active.

With lists of all the possible PEEKS and POKES in front of you, you can now

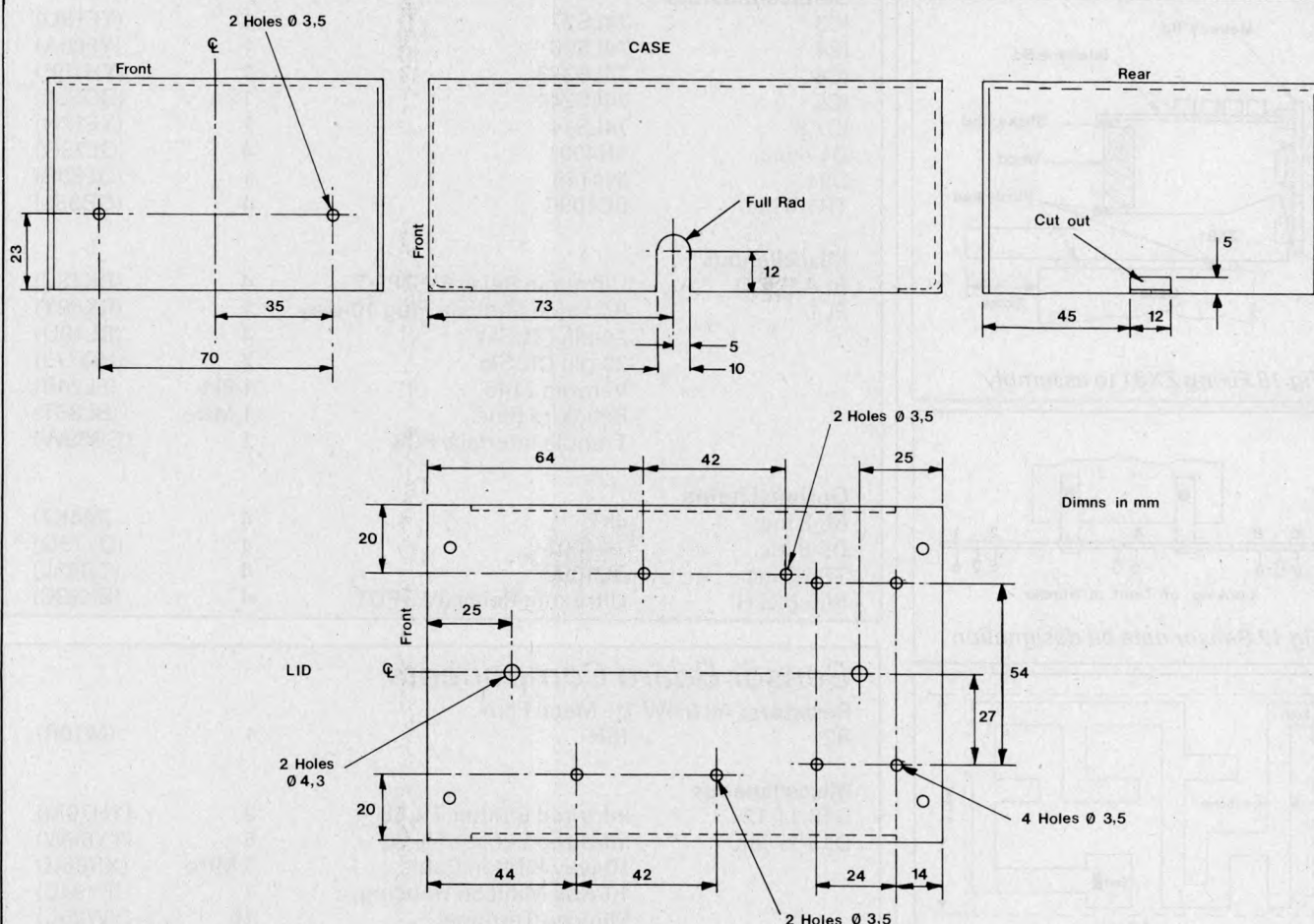


Fig 12a, b Box drilling details

PROJECTS

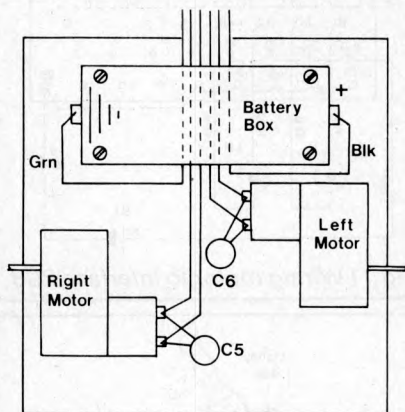


Fig 14 Chassis assembly & wiring

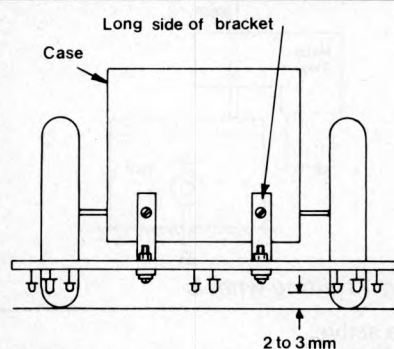


Fig 15 Mounting sensor PCB

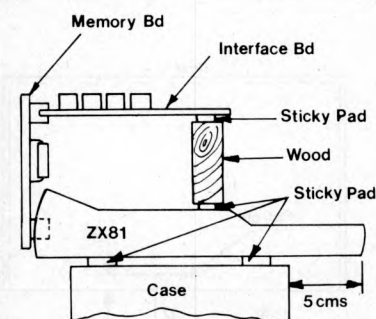


Fig 16 Fixing ZX81 to assembly

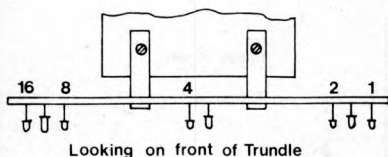


Fig 17 Sensor data bit designation

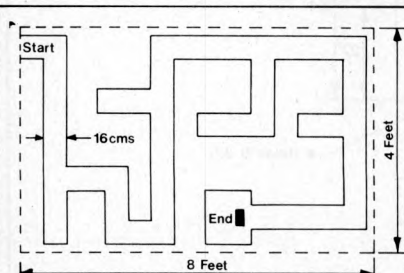


Fig 18 Track layout

Hardware Components

Capacitors

C5,6	470nF Minidisc	2	(YR76H)
------	----------------	---	---------

Miscellaneous

Case AC64	1	(XB56L)
Trundle Motor Assembly	2	(FT41U)
Trundle Wheels	2	(FT42V)
Trundle Bracket	2	(FT43W)
Battery Box HP2 Single	1	(BK46A)
6BA Bolt $\times$ 1/2in	1 Pkt	(BF06G)
6BA C/S Screws 1in	1 Pkt	(BF13P)
6BA Spacer $\times$ 1/2in	1 Pkt	(FW35Q)
6BA Nut	2 Pkts	(BF18U)
6BA Washer	2 Pkts	(BF22Y)
4BA Bolt $\times$ 1in	1 Pkt	(BF04E)
4BA Shakerwasher	1 Pkt	(BF25C)
4BA Nut	1 Pkt	(BF17T)
Quickstick Pads	1	(HB22Y)

Optional

B1	D Cell Battery	1	(FK57M)
----	----------------	---	---------

Interface Board Components

Resistors: All 0.4W 1% Metal Film

R1-4 inc.	4k7	4	(M4K7)
-----------	-----	---	--------

Capacitors

C2,3	100nF Minidisc	2	(YR75S)
C4	10 μ F 16V Tantalum	1	(WW68Y)

Semiconductors

IC3	74LS27	1	(YF18U)
IC4	74LS00	1	(YF00A)
IC6	74LS373	1	(YH15R)
IC5	74LS244	1	(QQ56L)
IC7,8	74LS14	2	(YF12N)
D1-4 inc.	1N4001	4	(QL73Q)
D9	IN4148	1	(QL80B)
TR1-4 inc.	BC109C	4	(QB33L)

Miscellaneous

RLA,B,C,D	Ultra-min Relay 6V DPDT	4	(BK48C)
PL1	RA Latch Minicon Plug 10-way	1	(RK68Y)
	14-pin DIL Skt	4	(BL18U)
	20-pin DIL Skt	2	(HQ77J)
	Veropin 2145	1 Pkt	(FL24B)
	Bell Wire Blue	1 Mtre	(BL86T)
	Trundle Interface PCB	1	(GB89W)

Optional items

R5-8 inc.	4K7	4	(M4K7)
D5-8 inc.	1N4001	4	(QL73Q)
TR5-8 inc.	BC109C	4	(QB33L)
RLE,F,G,H	Ultra-min Relay 6V DPDT	4	(BK48C)

Sensor Board Components

Resistors: All 0.4W 1% Metal Film

R2	10R	1	(M10R)
----	-----	---	--------

Miscellaneous

D10,11,12	Infra-red Emitter TIL 38	3	(YH70M)
D13-17 inc.	Infra-red Sensor TIL 78	5	(YY66W)
	10-way Ribbon Cable	1 Mtre	(XR06G)
	10-way Minicon Housing	1	(FY94C)
	Minicon Terminal	10	(YW25C)
	Trundle Sensor PCB	1	(GB90X)
	Veropin 2145	1 Pkt	(FL24B)

Memory Board Components

Capacitors

C1 100nF Minidisc 1 (YR75S)

Semiconductors

IC1 74LS00 1 (YF00A)
IC2 6116 1 (UF33L)

Miscellaneous

SK1,2 2×23-way PC Edgecon 2 (RK35Q)
24 Pin DIL Skt 1 (BL20W)
40 Pin DIL Skt 1 (HQ38R)
Trundle Memory PCB 1 (GB88V)

write a program! I would suggest the first thing you do is write a short routine to make Trundle run along a straight, correcting for drifts.

No, I'm not going to write it for you; that's your problem! Now do the same for dealing with bends. It is useful to know here that as you approach a corner, you can maintain a straight line on one wall. Also, if you stop when all the sensors see the black line at the top of a bend, Trundle is exactly in line to turn into the next passage.

Consider all the situations Trundle can get into and write routines for them. One of the most challenging will be to correctly get it out of a dead end. Unless you are careful, you will find that on coming out of the dead end, Trundle will go back to the beginning again. To avoid this, you will have to arrange a 'flag' in the program to indicate that a choice between two possible pathways was made and if you do hit a dead end, you take the alternative pathway on coming out of it.

Memory saving

If you can write in machine code, you could probably write a good program in the 500 bytes available in the original ZX81. However, we have assumed you will write in Basic so we have changed the memory to 2k bytes. This should be adequate provided you are not wasteful. Useful tips are:

1. Keep variable names as short as possible; each character you use costs a byte.
2. Frequently repeated numbers should be replaced with a variable. A good number to substitute with a

variable would be the 9000 repeated in the PEEKs and POKEs.

3. Wherever possible, replace 'IF PEEK 9000 = xxx' with LET D = PEEK 9000, so it would now read 'IF D = xxx'. A good place for this type of saving is in your correction routine. Note that this type of saving is not worthwhile in loops where the contents of the input port are being updated continually.

Signs of a nearly full memory are keyboard lock up, that is, what you type in not appearing on the screen. Incomplete screen listings appearing and most annoying of all, a complete crash, is signified by the screen going grey. If this happens, you've lost your program — so it is advisable to tape any complicated parts of program you've written as soon as they work.

Uses of Trundle

Firstly note that you can install another four relays if you wish. Space has been left on the board for this. You will of course also have to put in the extra transistors, diodes and resistors.

The input port will also accept a total of eight lines. The relays can be used to switch any piece of equipment up to a maximum of 24 volts at 1 amp. Note that they are not suitable for switching mains electricity. To attempt this would be very dangerous. The input port will respond to any system that can produce a suitable voltage transition (Fig 19a).

In the dark, this will produce a logical low at the computer. In the light, it will produce a high. Remember there is an inversion through the interface board. The preset can be adjusted to trigger a

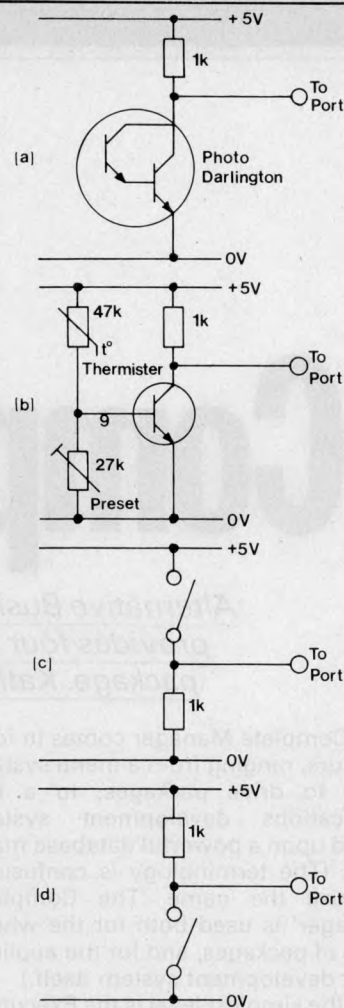


Fig 19 Suggested inputs, (a) Light operated (b) Temperature operated (c & d) Switch operated

high on the computer port at any derived temperature (Fig 19b). When the switch is open, the port will read a high (Fig 19c). When closed, it will read a low or if it is more convenient, the circuit can be reversed to give the opposite logic (Fig 19d).

You could monitor the doors and windows of a house with reed switches held closed with magnets. If somebody enters the house, the computer could be preprogrammed to recognise where the intruder had entered. Then switch on an alarm or tape recorder with a warning message. If you were to set this up permanently, it would be advisable to cut ventilating holes in the ZX81 case and preferably increase the size of the heatsink since the computer does get very hot when it is left on for long periods.

Use one of the original Trundle motors to move a conveyor belt made from an old bicycle inner tube. Objects moving along the belt could be monitored by placing light sensitive sensors along the belt.

For example, count total bottles passing along the belt with one sensor. Check that each bottle is upright. If one is on its side, stop the belt and use another relay to switch on a relay to push the fallen bottle off the belt. **END**

A complete kit of parts, excluding optional items, is available.

Order As LK 62S (Trundle Kit) Price £49.95. (A ZX81 computer is also required of course.)

The following are also available separately, but are not included in the 1985 Maplin catalogue:

Trundle Interface PCB. Order as GB89W Price £3.75.

Trundle Sensor PCB. Order as GB90X Price £2.50.

Trundle Memory PCB. Order as GB88V Price £2.75.

Trundle Motor Assembly. Order as FT41U Price £3.99.

Trundle Wheel. Order as FT42V Price 35p.

Trundle Bracket. Order as FT43W Price 29p.

The kit, or all parts separately, are available from Maplin Electronic Supplies Ltd., PO Box 3, Rayleigh, Essex and Maplin shops in London, Manchester, Birmingham, Southampton and Southend-on-Sea. Maplin catalogues are also available in all branches of W. H. Smith.



SCREENTEST

Complete Manager

Alternative Business Systems' The Complete Manager is just that — it provides four system levels in a powerful and flexible applications package. Kathy Lang assesses its suitability for all types of users.

The Complete Manager comes in four flavours, ranging from a menu system used to drive packages, to a full applications development system based upon a powerful database manager. (The terminology is confusing, because the name 'The Complete Manager' is used both for the whole suite of packages, and for the applications development system itself.)

At the simplest level is the Executive Manager, which is essentially a shell providing the ability to construct menus which give access to other application packages, both those written in The Complete Manager itself (for which it provides a run-time system) and third party application packages such as word processors and spreadsheets. A version which includes electronic mail and a diary is available for Unix-based systems. The Executive Manager can thus be likened to the kind of 'electronic office' environment provided by many of the suppliers of major office systems, but with the 'building blocks' constructed from a much wider variety of sources if the user requires that flexibility.

The second level of The Complete Manager is The Enquiring Manager, which is essentially a simple, single-file data management system providing basic facilities in the same part of the market as DMS+, Friday! and Trendisk. The Enquiring Manager is constructed from Complete Manager commands, but is itself menu-driven and reasonably simple to use. I understand that it was originally intended primarily as a demonstration of what The Complete Manager can achieve for ordinary users, and as a simple way in to The Complete Manager.

A number of users have, however, found The Enquiring Manager to be of considerable value in its own right, and it is being developed to provide

additional facilities. These are functions which are available within The Complete Manager, but which can at present be accessed by users of The Enquiring Manager only by executing modules which they have constructed in The Complete Manager.

The Complete Manager is a powerful and flexible applications development system, which has at its core a database manager called MKFS. This database manager is also accessible to programs written in high-level languages where additional database handling functions are needed, or where programs need access to files created in Complete Manager applications. In this review, I'll concentrate on The Complete Manager as an applications development system, since the other parts of the package are generated by it or provide a subset of its facilities.

The Complete Manager is essentially a command-driven package which includes within it a command for creating menus, so that sets of Complete Manager commands may be grouped together and invoked from menus. Commands are of two types: immediate commands, which are executed as soon as they are entered (like statements without line numbers in Basic); and stored commands, which are executed when an EXECUTE or RUN command is issued. Any command can be made immediate simply by prefacing it with EX (for EXECUTE). The term 'stored' is a trifle misleading — it refers to the set of commands currently in memory, which may in turn include references to sets of commands stored on disk as macros.

The Complete Manager comes with a set of commands, called internal commands, which developers may use but may not change. They may,

however, set up commands of their own, known as external commands in The Complete Manager, which consist of sets of internal and external commands: that is, any external command may include calls upon other external commands. This ability to nest commands — comparable with the use of true subroutines (more powerful than the despised Basic GOSUB) and with the DO command in dBaseIII (which allows the passing of parameters) — is an extremely powerful feature, and one which gives developers' packages (such as The Complete Manager) control facilities comparable with those of good high-level languages.

The Complete Manager stores records as fixed length strings of characters, or combinations of character and binary data. The structure of each record is fixed in the sense that each record must be identical in length, and in order and length of sets of data items of the same type (real numbers, characters, whole numbers). On the other hand, the structure is more flexible than such a description would suggest in the sense that field definitions and the information about how these describe the records are held separately from the records themselves, and any set of records may be described in several different ways.

This is an unusual approach for a microcomputer package. The Complete Manager allows up to ten data files to be open at once, and provides commands to facilitate their linkage.

The Complete Manager is also unusual among microcomputer packages in being truly multi-user. It provides facilities for record locking and unlocking to prevent updating by more than one user at a time. This feature in part reflects its history as a package initially written for a large minicomputer — the Prime — and

then implemented on other minis running Unix and similar operating systems, as well as onto networked micros. The Complete Manager is a British product, written by Alternative Business Systems, and supplied and supported by Pipeline (part of the Tamsys Group) through its network of dealers.

Constraints

Size constraints are unlikely to worry people using The Complete Manager, but the absence of a special date format will be a problem for some, mitigated to some degree by special functions for handling both dates and times. The requirement to have a unique primary key may also cause difficulty in some applications.

File creation and indexing

In order to be able to enter data into records, to amend them, and to analyse them to produce reports, The Complete Manager must be told the format of those records. There is, however, no permanent association between the description of a record format and the data file containing the records. Record definitions are set up using one of two Complete Manager commands, the main differences being in the amount of prompting available and whether amendment is available. When setting up a record definition, you specify for each field its name, type (which includes lists — that is, single-dimension arrays), length in the record and in reports, position in the record (which may be 'immediately following the field I defined last'), and, if you wish, other attributes such as whether the field should be restricted to viewing only. You also assign to each field a unit number, which is used to associate a particular set of field definitions with an appropriate file of data, for when you open a file you must specify the unit number used to reference it. (This has some parallels with the approach used by Basic for handling random access files.)

Every data file may have up to ten keys; these keys may be individual fields or they may be any section of the record which is contiguous, so a key may span more than one field or cover only part of a field. The keys are specified when the file is created through the CREATE command; the first key specified is the primary key, whose value must be unique to each record. If you subsequently need to define extra key fields, you must copy the data file to a new file created with the required key specifications.

Within The Enquiring Manager, menu options are provided to enable you to set up record formats and create files without having to use commands and remember their method of use. This facility is implemented using The Complete Manager's ability to take information from

the screen, and use it to create files and field definitions.

Data input and updating

When updating files, the first essential is to provide a set of field descriptions for the file(s) you intend to update, and to open the data file(s) on unit numbers which match those in the appropriate field descriptions; this allows The Complete Manager to relate each data file to its record definition.

The Complete Manager then provides a variety of ways in which to add and amend data. Probably the simplest is the BUILD command, which takes a file number as its parameter. The Complete Manager then presents a default screen format showing all the fields defined for that file number, and allows you to enter values into the fields. If you enter a new value into the primary key field, BUILD will add the record to the file. If you enter an existing value, The Complete Manager requests confirmation before overwriting the existing record.

More sophisticated entry and editing is provided by the ADD and CHANGE commands. Using ADD, you can set up a set of new values for the record in memory, and then save them as a new record. This allows you to accept data via your own screen formats, carry out any validation that may be needed, and calculate field values which depend on the contents of other fields.

The CHANGE command allows similar flexibility: it is prefaced by either the FIND or the NEXT command, to retrieve a specific record or to get the next record in the current key order. It is thus possible to work through a file in order by any key, and you can change the key used for this purpose at will.

The Enquiring Manager uses these commands to provide interactive entry and editing for one file at a time, using simple menus and lists of options. You can, of course, develop more complex systems in which several files are amended in one operation.

Screen display

When entering, amending or viewing data, you can either rely on the simple default format used by the BUILD command, or exploit The Complete Manager's facilities for direct cursor addressing to design more carefully tailored formats. This means that, using the DISPLAY command, you can place prompts anywhere on the screen, and using the ACCEPT command you can take data from any position. This involves specifying the row and column position of the displayed information, either as absolute coordinates or relative to the most recent cursor positioning.

The Complete Manager does not, however, allow you to 'read' the current position of the cursor if it is moved by the user in an unpredictable way. As a result, the facility which The Enquiring

Maximum file size	OSL
Max record size (ch)	2000
Max no fields	150
Max field size	48
Max digits	14
Max prime key length	30
Special disk format?	N
File size fixed?	N
Link to ASCII files?	YF
Data types	N, C, I, List
Fixed rec structure?	N
Fixed record length stored?	Y
Amend rec structure?	Y
Link data files?	Y
No. data files open	10
No. sort fields	10+
No. keys	10
Max key length (chars, fields)	24, 24
Subsidiary indexes kept up-to-date?	UTD
Data validation	DIY
Screen formatting	C, D
Unique keys	1M
Report formatting	C, D
Store calculated data	IN, ED, BA
Totals and Statistics	Y
Store selec'n criteria	A, O, N
>1 criterion/field?	Y
Wild code selection?	SW
Browsing methods	AK
Interaction methods	M, C, FT
Reference Manual+	**
Tutorial Guide+	***
Reference Card+	N
Online Help+	**
Hot-line?	P

Fig 1 Features and constraints

Manager provides to allow you to construct your own simple screen formats must, since it uses The Complete Manager facilities, ask you for the column and row coordinates of each prompt and field — no paint-a-screen approach is possible.

In addition to the formatted screen formats using cursor addressing, The Complete Manager provides two view-only formats. The LIST command is immediate, and shows the values for every field for each record in a file using a default display format. The WRITE command works in a similar way to the DISPLAY command, but is intended for showing information which is only to be viewed. Any report designed with the WRITE command can be displayed or printed, but its primary purpose is to give formatted reports for listing on the printer.

Printed reports

Any report which can be displayed can be sent to the printer, either by echoing screen input using operating system facilities (for example, CTRL/P in CP/M and MS-DOS) or by directing output to the system list device. System commands control the default dimensions of items such as page length, relating to the formatting control options in the



SCREENTEST

Calculation

Calculations can be carried out on any numeric fields from data files, or on temporary variables defined as being held in 'file zero'. Arithmetic operators and brackets are available. There is also a 'scale' function, which allows you to have all numeric values scaled by 10 to a given power on input and rescaled on output, thereby maintaining values to a higher precision than would be possible if they were stored at their displayed precision.

Multiple files

Within The Complete Manager, files are referred to by number (which may be a constant or a variable); the connection between numbers and names is made by an Open statement for each file. When processing two or more files, you can link them by reference to any key field in the subsidiary files and any field in the main file. Procedures carried out using RUN will use this process implicitly: that is, linkages are always attempted. Procedures executed using the RUN command work by reading in one record at a time from the main file in use with an appropriate set of file definitions.

If we suppose that such a set of definitions includes a field called 'dept', whose value is to be used to extract a corresponding record from another file, then the FIND command could accomplish such a linkage. The command 'find 1,2,dept' would take the

value of 'dept' from the main file and use it to match the second key of the file opened on unit 1. This matching would be attempted once for each record in the main file.

Where procedures are carried out using the EXECUTE command, the same approach can be used but it may be conditional if you wish: that is, the FIND command may be included in IF loops. It is, of course, possible to check whether a FIND command has been successful. It is also possible to use any variable as the match for FIND, including values read in from the keyboard or calculated from other field values.

Tailoring

Many of The Complete Manager's basic facilities come within the range of features which are needed to enable you to tailor a system for your own or others' use. Among those not yet mentioned are the ability to include commands within a WHILE...ENDW loop, to branch anywhere in the current procedure using GOTO (and I mean anywhere, including into IF and WHILE loops), and the ability to construct menus. These may include hidden options which are available only to the *cognoscenti*. For example, on the main The Enquiring Manager menu as distributed, if you know about it then pressing a single key will get you into the full The Complete Manager environment, but no such option is displayed on the menu.

The Complete Manager makes it possible to allow the user to press ESCape at any point, and to react in predictable ways to this key. It is also possible to provide screens of Help text through a 'short-cut' screen display command called MASK, which simply takes the file of text given and displays it on the screen in a sensible layout, replacing temporarily the previous screen image.

WRITE command. This command also allows the inclusion of headers and footers, and of system variables such as the date and the current page number of the report. When used with the ON command, it can output sub-totals (using keys as break fields) and performs various other formatting tasks such as starting a new page.

The Enquiring Manager uses the facilities of The Complete Manager to allow the production of simple columnar reports.

Selection and sorting

In addition to the facilities already described for selecting individual records, there are two main ways in which you can select sets of records for inclusion in a report or list using The Complete Manager's two methods of cycling through records in a file.

The EXECUTE command carries out the specified procedure once. If you want to carry out parts of the procedure on many records, you include them in one of The Complete Manager's repeat loops (see Tailoring) and then make any selection tests using the IF...THEN...ELSE...ENDIF commands. The conditions which can be attached to IF include the usual comparison operators (equals, less than, and so on) together with string comparisons allowing you to test for whether a character field starts with, ends with or contains the test string. Where more than one criterion is used, you can ask for them all to be met, or any combination, using AND, OR and brackets to determine the correct order of evaluation. Where you simply want to carry out one set of commands once for each record on the file, you can use the RUN command. This cycles through the data file, executing each command in the named procedure once for each record. You can attach selection criteria to the RUN command, so that the procedure is executed only for those records which meet the criteria. These criteria can be set up using the same tests and combinations as those described for the IF command.

Within The Enquiring Manager, you can attach conditions to the production of a report, and again these may include any or all of the tests and combinations described for the IF command.

Sorting is achieved by using the index keys as sort fields. The Complete Manager allows the use of any or all of the keys for ordering purposes when producing reports. Within The Enquiring Manager, you are restricted to a single key for ordering reports. If you wish to change the way the file is indexed, you must copy the data to a new file which has been created using the new key definitions. The field definitions can be re-used, since they form a template laid over the physical data in whatever file it is stored.

BM1	Time to add one new record	Inst
BM2	Time to select record by primary key	Inst
BM3	Time to select record by secondary key	Inst
BM4	Time to select 20 records from 1000 sequentially on three-character field (same field as in BM2 key)	4mins 15secs
BM5	Time to access record using wild code	Inst
BM6	Time to index 1000 records on three-character field	37mins 40secs
BM7	Time to sort 1000 records on five-character field	N/A
BM8	Time to calculate on one field per record and store result in record	4mins 15secs
BM9	Time to total three fields over 1000 records	4mins 40secs
BM10	Time to add one new field to each of 1000 records	32mins 40secs

Time to import a file of 1000 records: 20mins 6secs

Notes: NT = Not tested; NP = Not possible; + = including scrolling
Where two times are given, first is access to first record, second is access to each subsequent record

Fig 2 Benchmarks recorded on IBM PC/XT, H

Any set of The Complete Manager commands may be grouped together to form a macro, and stored in a file in the local or system macro directory. Where this is done, you can call such macros with parameters which are substituted by the appropriate values when the macro is invoked. When the macro finishes, any variables altered within the macro will retain those values. In most respects, including the facility for immediate execution provided by pre-facing the name with the EXECUTE command, macros are equivalent to internal commands. The main difference is that macro names cannot, as internal command names can, be abbreviated to their minimum recognisable length.

Creating and editing The Complete Manager macros is achieved by using an appropriate editor. If the editor is named ED.COM it can be called from within The Complete Manager, and can be used either to edit the set of commands currently within memory, or to edit a named file of commands and/or file descriptions. Such editing is facilitated by the RESET command, which clears the memory of all commands but leaves file definitions in place. This allows you to test several macros in succession without resetting file definitions as well.

Security & housekeeping

In a multi-user system, the commands LOCK and UNLOCK allow the system developer to protect records against more than one user attempting to change them at a time.

The Complete Manager includes facilities for copying and deleting files. It also has the ability to ATTACH to any directory, so that files may be located in any directory where the operating system provides these facilities. You can also execute operating system commands from within The Complete Manager, again if the operating system permits it: for example, on versions 2.0 and above of MS-DOS and PC-DOS.

Links with outside

An unkeyed MKFS file containing only character data is simply a fixed-format,

ASCII sequential file. To import data, therefore, one must ensure that the file contains fixed length fields in the appropriate order, create a file in The Complete Manager specifying the appropriate key field positions, and then copy the external file into it. As you would expect, the implication is that ASCII sequential files can be used directly within The Complete Manager, but none of the direct access commands would then be available.

User image

It is always hard to judge the user image of a package which can be so completely tuned to the user's requirements as can the two simple elements of The Complete Manager, namely The Executive Manager and The Enquiring Manager. In a sense it is unfair to try, since what any user will see will depend on what the system developer has made of the system. Probably the most it is fair to say is that The Enquiring Manager as shipped should be reasonably straightforward for most people to use, if rather pedestrian and limited in its function.

About the underlying development system, however, there need be no such hesitation. As someone who is used to command-driven systems, I found The Complete Manager easy to use. Online help is available, although most floppy systems could not accommodate The Enquiring Manager menus and macros, as well as The Complete Manager itself and all the Help files, on a single floppy disk. For this and other reasons the system is better suited to a hard disk system.

I would expect a novice user, however, to fare badly, although this is probably more the fault of the documentation than of the basic user image of The Complete Manager. On the whole, I would say that the difficulties a novice would experience are inherent within the nature of command-driven systems, where such Help as is provided is only in the form of text screens which can be summoned up by request. This means that, even at the beginning, the user must have a reasonable picture of the way the package functions to get anything out of it.

Documentation

Such a verdict on the user image puts a premium on the quality of the documentation.

The introduction to The Complete Manager is in fact a discussion of all its features at a relatively simple level. I felt it to be lacking in two ways: there is little in the way of an explanation of the overall approach of the system (there is an introduction to commands, but no explanation of how they are actually used in conjunction with file definitions), and there are far too few examples. I found it quite hard going. I suspect that a novice user, who had mastered The Enquiring Manager and wanted to progress further, would find it very difficult indeed.

The reference list of commands also lacks sufficient examples. In addition, it suffers from an even more serious disadvantage: it is neither rigorous nor comprehensive. In some cases, the command description tells you if it is immediate or stored, but often it doesn't — you just have to try it out. Such description of each command, as is given, is often extremely terse, with a single very short uncommented example, often full of meaningless 'etc's where fuller examples could have given more clues to the way the system is commonly used.

Included with the software are two simple demonstration The Complete Managers systems; the commands used by these systems are listed at the front of the manual. Although not quite uncommented, there are insufficient comments to make it easy to follow what is going on, so what could have been the most helpful part of the manual is much less than it could be. A final criticism — the manual is A5, in typed format, right justified, an approach which does not make for the easiest of reading.

Conclusion

Novices wishing to use The Enquiring Manager should be able to get going without too much trouble, and that system can be used in a simple way. It is not, however, intended for people who will never need the full power of The Complete Manager, nor would it be cost-effective to buy the complete package just for that part. I do not believe that an inexperienced computer user, aided only by the current documentation and with a reasonable expenditure of effort, could come to grips with The Complete Manager at the command level.

For system developers, however, and for experienced users wanting a powerful and flexible data management system with multiple files, parameterised procedures and true multi-user capability, The Complete Manager would be well worth investigating. But even for such users, some improvements in the documentation would be highly desirable. **END**

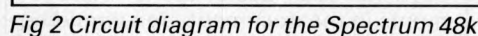
Summary

Supplier	Pipeline Software
Tel	(07535) 56747
Cost (£)	£530/130
Systems	86, MS, PC, Unix, MU
Version reviewed	1.1
Type	F, E
Features	Three-level system: underlying package is command-driven, with up to 10 files in use at once, multi-user features, parameter-driven macros, all indexes kept up-to-date. Top-level Executive Manager is run-time system (£130).
Drawbacks	Short fields, no date type (although functions provided), primary key must be unique.
Ease of use	Acceptable for experienced users, although documentation poor. Levels 1 & 2 OK for novices, command level very hard.

The new *Channel 4* computer news and current affairs programme for serious computer users currently being broadcast (Monday 5.30-6.00pm from 11 February) offers its viewers a unique opportunity to participate in an experiment. We're all used to transmitting software by making electrons run up

During the broadcast of *4 Computer Bufts*, a flashing white square will appear on the screen roughly where the *TV AM* clock usually sits. If you make a receiver by following the instructions below, you'll be able to pick up free

Sounds crazy? At least one company we know of, Firstquad Ltd, has applied for a patent for a system which offers commercial data transfer rates and data security levels. If you're interested the



company is on (0222) 752189.

Having constructed a receiver, you need to calibrate it for your particular TV set using the calibration program for your micro. Picking up software is then easy. Tune into *4 Computer Buffs*, connect the receiver, load and run the receiver software, and press the space bar when told to. By the end of that edition of *4 Computer Buffs* you'll have a program in memory which you can save to tape or disk and run in the normal way. Note that the receiver board will only work with the 48k version of the Spectrum. Unfortunately the 16k Spectrum doesn't allow the necessary control over timing.

The actual light detection is done by a phototransistor mounted in a sucker, which is fixed to the screen over the flashing white square.

Construction

To construct the circuit you'll need a piece of veroboard, approximately 60mm x 40mm. The 74LS123 chip is mounted in a 16-pin DIL socket, rather than soldering it in directly. Care should be exercised when soldering the transistors to ensure that excess heat is not applied. Ensure also that the capacitor is put in the right way round, as it is of the electrolytic type and will blow up if connected backwards. The rest of the components are inserted as shown on the circuit diagrams (Figs 1, 2).

The phototransistor is mounted in the centre of the rubber sucker. The best type of sucker is that sold with hooks for the cups (Fig 3).

Try to make as small a hole as possible to achieve an air-tight fit. If necessary a blob of silicon rubber can be put over the hole to seal it (Fig 3).

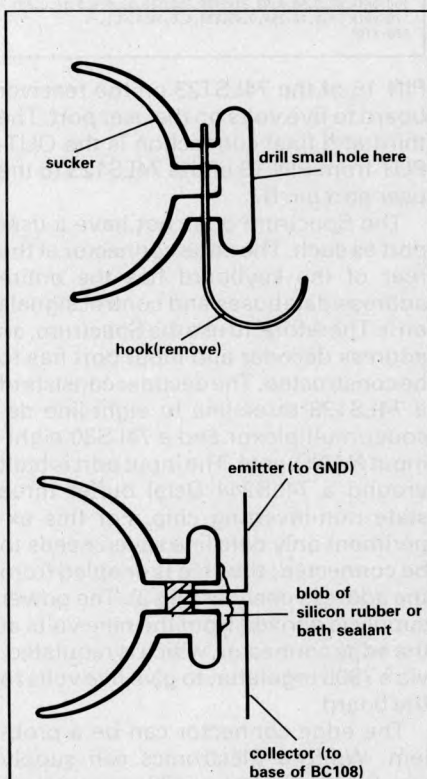


Fig 3 Mounting the phototransistor

Procedure for tuning the receiver board ready for the software broadcast

The following steps should be carried out in a room with low lighting and definitely no direct light on the television screen.

The Basic programs should be typed in and saved onto tape or disk before carrying out the tuning or receiving procedures. The instructions for these procedures assume that the tuning program has been saved with the name TUNE. And that the receiving program has been saved with the name REC.

First set up your computer as normal, using the television set that will be used for the broadcast. Make sure the receiver board is plugged into the computer's port correctly before you switch on.

Then load and run the tuning program:

BBC	CHAIN 'TUNE'
	CALL & 900
Spectrum	NEW
	LOAD 'TUNE'
	RUN
Commodore 64	LOAD 'TUNE'
	RUN
	SYS 49152

Adjust brightness and contrast, so that the writing on the screen is a clear white on a steady dark background. Make sure there are no streaks of light across the screen.

Place the sucker over the solid white block in the bottom right-hand corner of the screen. Make sure that it is firmly stuck to the screen.

If there is not also a '*' on the display in between the two pointers -> and <-, adjust the variable resistor's value so that one appears. Each time you change the value of the variable resistor, press the space bar afterwards. *This is very important.*

Now adjust the resistor in small steps, so that the '*' just disappears. Again, remember to press the space bar after every adjustment of the variable resistor. Before you can be sure that you have correctly tuned in the board, the tuning program should be left to run for as long as possible after you have made the star disappear. A time of 15 minutes should be adequate. If the '*' reappears during this time then repeat this step again.

Once the board has been tuned in, you are ready to receive the broadcast of software. Now read the procedure for doing so.

Once you have tuned in the receiver board, do *not* alter the value of the resistor on the board, or the brightness, or contrast controls on the television.

The input to the BBC Micro is via the user port and is a 20-way (female) IDC connector. The user guide is misleading about the orientation of this plug.

Check with a volt meter if you have one — look for GND and +5v. One wire must go from ground on the receiver board to one of the ground pins; another from

Procedure for receiving a program transmitted during 4 Computer Buffs

The following steps should be carried out in a room with low lighting — definitely, no direct light on the television screen.

Before *4 Computer Buffs* is due to start, set up your computer as you would do normally, with the receiver board plugged into the port.

Load and run the receiving program:

BBC	*RUN BBCREC
	CHAIN 'REC'
	CALL 900
Spectrum	NEW
	LOAD 'REC'
	RANDOMISE USR 45056
Commodore 64	LOAD 'REC'
	RUN
	SYS 49152

Your computer is now ready to receive the software.

Switch on the television and tune into *4 Computer Buffs*. When it starts, place the receiver sucker over the solid white block in the corner of the screen. Make sure that it is firmly stuck to the screen.

Just before the software is transmitted, you will be told to press the space bar on your computer. After this, the computer will start downloading the program. When the transmission has finished, save the program onto tape or disk using the usual instructions for saving a Basic program.

Before you try to run the software, it is advisable to switch the computer off and on again so that it is completely reset. Load the program back into your computer using the normal instructions for loading a Basic program, and run it.

If you are using the same television set for your computer and for watching the television program, take care that you don't accidentally knock any of the leads when connecting, or disconnecting, the television.

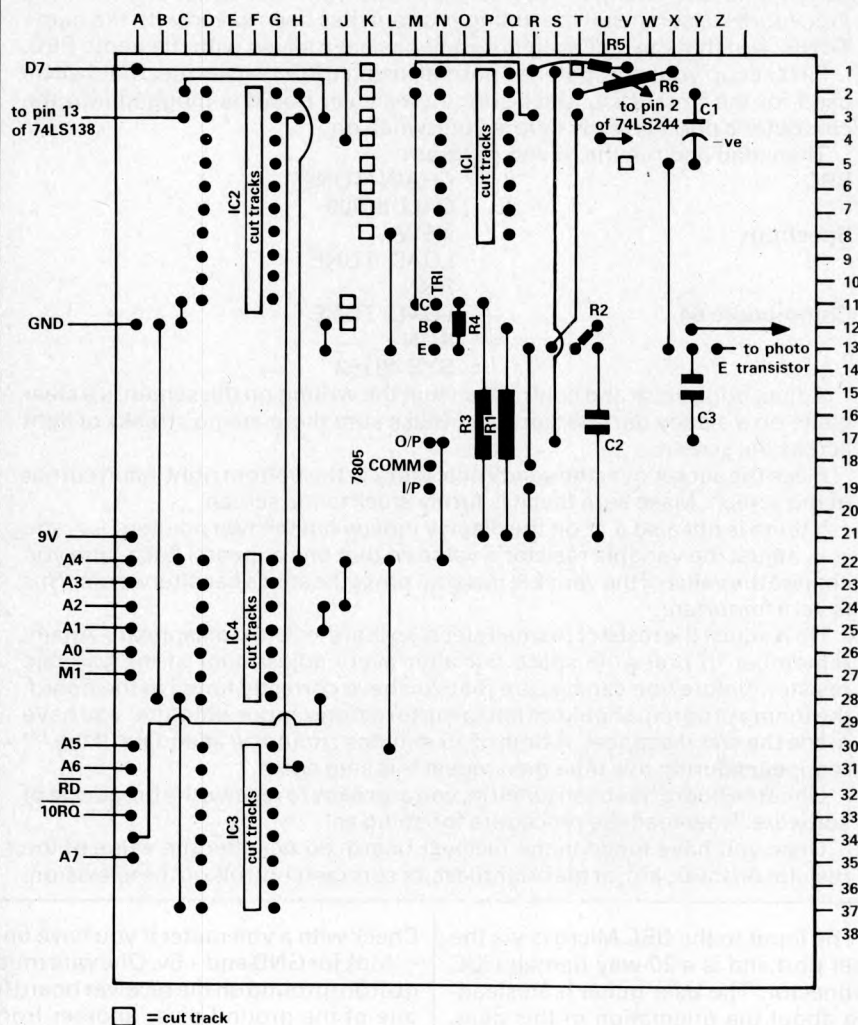


Fig 4 Component mounting for the Spectrum 48k

Component list

Spectrum Resistors

1 of	150k	R1	1/4-watt carbon
1 of	100k	R2	1/4-watt carbon
1 of	2.7k	R3	1/4-watt carbon
1 of	1.8k	R4	1/4-watt carbon
1 of	3.9k	R5	1/4-watt carbon
1 of	22k	Preset R6	1/4-watt carbon

Capacitors

1 of	6.8µF Tant bead C1
2 of	0.1µF Disc ceramic C2,C3

Semiconductors

1 of	7805	
1 of	74LS123	1C1
1 of	74LS244	1C2
1 of	74LS138	1C3
1 of	74LS30	1C4
1 of	BC108	TR1
1 of	FPT100	From Tandy stores: Cat No 276-130 or 2N5777 (Phototransistor)

Miscellaneous

Rubber sucker from any ironmonger or DIY shop
 28-way double-sided edge connector 1.90
 Pair PP3 snap battery connectors
 1-14 pin DIL socket, 2-16 pin DIL socket, 1-20 pin DIL socket

```

10 REM RECEIVER PROGRAM FOR COMMODORE 64
20 A=49152
30 READ N:IF N=0 THEN GO TO 60
40 POKE A,N:A=A+1
50 GOTO 30
60 END
70 DATA 165,45,133,252,165,44,133,253,169,0
80 DATA 141,3,221,32,228,255,201,0,240,249
90 DATA 32,77,192,32,117,192,133,254,32,77
100 DATA 192,32,117,192,201,0,208,4,165,254
110 DATA 240,25,32,77,192,32,117,192,32,77
120 DATA 192,32,117,192,32,77,192,32,117,192
130 DATA 201,0,208,246,76,20,192,96,160,124
140 DATA 136,208,253,202,208,248,96,169,9,133
150 DATA 251,173,1,221,41,128,208,249,162,15
160 DATA 32,68,192,169,0,72,173,1,221,10
170 DATA 104,106,162,30,32,68,192,198,251,208
180 DATA 240,162,30,32,68,192,96,-1
    
```

```

10 REM TUNING PROGRAM FOR COMMODORE 64
20 A=49152
30 READ N:IF N=0 THEN GO TO 60
40 POKE A,N:A=A+1
50 GOTO 30
60 END
70 DATA 169,0,141,3,221,169,0,141,32,208
80 DATA 141,33,208,169,147,32,210,255,169,5
90 DATA 32,210,255,174,126,192,172,127,192,32
100 DATA 103,192,162,36,160,22,32,92,192,169
110 DATA 113,32,210,255,173,1,221,10,176,12
120 DATA 162,5,160,3,32,92,192,169,42,32
130 DATA 210,255,32,228,255,240,233,201,3,240
140 DATA 15,162,5,160,3,32,92,192,169,32
150 DATA 32,210,255,76,44,192,169,147,32,210
160 DATA 255,96,152,72,138,168,104,170,24,32
170 DATA 240,255,96,134,251,132,252,160,0,177
180 DATA 251,240,12,32,210,255,230,251,208,243
190 DATA 230,252,76,107,192,96,128,192,13,65
200 DATA 68,74,85,83,84,32,82,69,83,73
210 DATA 83,84,65,78,67,69,32,85,78,84
220 DATA 73,76,32,34,42,34,32,68,73,83
230 DATA 65,80,80,69,65,82,83,46,13,13
240 DATA 32,32,45,62,32,32,32,60,45,13
250 DATA 13,84,79,32,82,69,83,69,84,32
260 DATA 82,69,65,68,73,78,71,32,80,82
270 DATA 69,83,83,32,65,78,89,32,75,69
280 DATA 89,46,13,13,80,82,69,83,83,32
290 DATA 60,82,85,78,47,83,84,79,80,62
300 DATA 32,84,79,32,69,88,73,84,32,80
310 DATA 82,79,71,82,65,77,46,0,-1
    
```

```

10 REM * tuning program for ZX Spectrum *
20 CLEAR 45055
30 LET a=45056
40 READ n: IF n=0 THEN GO TO 50
45 POKE a,n: LET a=a+1
46 GO TO 40
50 BORDER 0: PAPER 0: CLS: INK 7
55 PRINT AT 21,31;"■"
60 PRINT AT 1,0;"Adjust resistance"
70 PRINT AT 3,0;"until '*' disappears"
80 PRINT AT 5,2;">"
90 PRINT AT 7,0;"To reset reading press any key."
100 PRINT AT 9,0;"press <break> to exit program."
120 LET x=USR 45056
130 IF x=0 THEN PRINT AT 5,5;"*": GO TO 120
140 IF x=1 THEN PRINT AT 5,5;" ": GO TO 120
160 DATA 62,0,50,8,92,219,159,230,128,32,5,6,0,14,0,201
170 DATA 58,8,92,254,0,40,238,6,0,14,1,201,-1
180 STOP
    
```

PIN 16 of the 74LS123 on the receiver board to five volts on the user port. The third and final connection is the OUTPUT from PIN 13 of the 74LS123 to the user port pin B7.

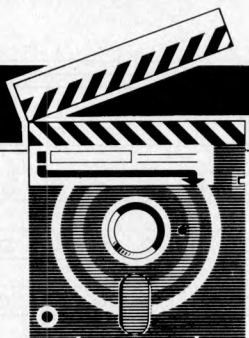
The Spectrum does not have a user port as such. The edge connector at the rear of the keyboard has the entire address/databuses and control signals on it. Therefore, to use the Spectrum, an address decoder and input port has to be constructed. The decoder consists of a 74LS138 three-line to eight-line decoder/multiplexor and a 74LS30 eight-input NAND-gate. The input port is built around a 74LS244 Octal buffer three state non-inverting chip. For this experiment only data line seven needs to be connected; the chip is enabled from the address decoder (Fig 2). The power supply is derived from the nine volts at the edge connector, which is regulated, via a 7805 regulator, to give five volts to the board.

The edge connector can be a problem. Watford Electronics can supply one for the Spectrum (28-way double-sided 0.1in pitch), or you can buy a 43-way, double-sided, 0.1in pitch con-


```

10 REM RECEIVER PROGRAM FOR BBC
20 A2=800
30 READ NX: IF NX<0 THEN GO
40 ?A2:N2:A2=A2+1
50 GOTO 30
60 END
70
80 DATA 169,0,133,113,165,24,133,114,169,0
90 DATA 141,98,254,32,224,255,32,61,9,32
100 DATA 101,9,32,61,9,32,101,9,41,128
110 DATA 208,19,32,61,9,32,101,9,32,61
120 DATA 9,32,101,9,201,123,248,246,72
130 DATA 9,32,101,0,136,208,253,202,208,248
140 DATA 96,169,9,32,113,112,173,96,254,41,128
150 DATA 208,249,162,15,32,52,9,169,0,72
160 DATA 173,96,208,20,104,106,162,30,32,52
170 DATA 9,198,112,258,240,162,30,32,52,9
180 DATA 166,160,0,145,113,230,113,208,2,230
190 DATA 114,96,0,1

```

SCREENTEST

Office practice

Following the first wave of integrated software packages such as Symphony, Framework and Open Access, which combine a spreadsheet, a word processor and a database, Mike Liardet looks at another trend — the so-called 'desktop' applications.

The idea behind desktop managers is to remove that clutter of address books, diaries and calculators from the top of the desk and embed them in the computer instead.

Some readers may consider a desktop manager to be of dubious value, replacing a few portable and accessible notebooks with an intimidating computer system. In one sense this is right. If the sole reason for getting computerised were to run a desktop manager, then this would be a bit like buying a Ferrari just to listen to its stereo. But anyone who is already computerised may consider a desktop manager a valuable asset.

Whereas integrated spreadsheet/word processor/database systems provide an environment for doing just about anything you could conceivably want, the desktop managers are more limited in scope but considerably easier to use. This article will take a broad look at three of them, all of which are for the IBMPC: Sidekick, QED+, and Spotlight. The most striking thing about these systems is their similarity, in their core facilities at least. It is probable that they were all designed and implemented in ignorance of the others, yet there is an uncanny resemblance between them.

Sidekick

Sidekick was written by Borland International and is distributed in the UK by Altor Computer Software. Sidekick is by far the cheapest of the three systems, but that is no expense spared with respect to quality. It is supplied as a slim paperback manual with a copy-protected disk. The files on the disk can be freely copied, to a hard disk for example, but the original disk must always be present when Sidekick is first loaded. If this arrangement is too cumbersome

then Borland will supply an unprotected version for 'a small extra charge'.

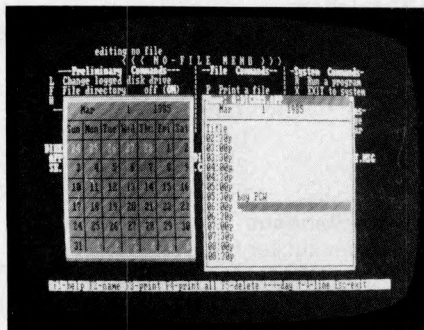
To load Sidekick simply type 'SK', then, following a brief message, control is returned to the operating system. If you are unfamiliar with desktop managers you can easily assume that something is wrong because nothing seems to have happened. Actually all the software has been loaded into memory, protected from being overwritten by anything else, and the operating system modified to respond to a special keystroke. The consequence of this is that, having loaded Sidekick, you can forget about it and use your normal software packages as if it weren't there. But press the CONTROL and ALT keys together, and up pops a Sidekick menu in the middle of your screen; you can use any of its functions from then on. Once you are finished, the screen is completely restored to its original state and the original application continues as if there had been no intervention at all. If you just want to use Sidekick without any other application, then you just press CONTROL and ALT in response to the normal DOS prompt.

The only overhead for Sidekick arises from the extra memory needed. If one of your applications already consumes

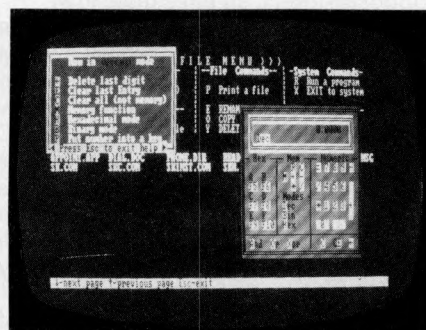
all available RAM, it will not be possible to have Sidekick loaded simultaneously. The complete Sidekick program requires about 60k of RAM, and if this is only just too much, then the supplied disk offers some alternative incomplete versions which lack one or other of the facilities.

After pressing the magic key, an eight-option menu is displayed. Five of the options are for the five Sidekick applications, and there are also help, exit and setup options. Menu selection can be made in a variety of ways: by pressing a function key (F1 to F8 for each of the eight options); by pressing a single letter, usually the initial letter of the option; or by moving a horizontal bar which illuminates the current option. This may sound complicated, but it's very easy — the chances are that you are already familiar with at least one of these methods and can use that.

Sidekick has fairly extensive help facilities which are supposedly 'context-sensitive', but are actually only sensitive to the main menu and each of the applications. These are presented as pages of text which you can flick through using the arrow keys, and constitute a useful supplement to the manual.



Sidekick's calculator



WordStar behind the calendar/diary

The notepad facility is the first of the five Sidekick applications. When it is selected a notepad window appears at the bottom of the screen with the rest unchanged. This window can be moved, enlarged or shrunk using the function and arrow keys clearly outlined at the bottom of the screen. Text can be entered and edited into the notepad window in a fairly standard word processor fashion — in fact, Borland has unashamedly copied WordStar's keystrokes. It does not, however, implement all the WordStar facilities and is limited in capacity too, at least in the standard configuration. (You can improve the capacity by modifying a present parameter — this is at the expense of extra memory consumption.)

Notepad does offer the chance to 'capture' text from the original screen into your notes. To do this, you press a function key which redisplay the original screen. You then mark the beginning and end of the text to be captured (using WordStar block beginning and end keystrokes) followed by the block-copy command. The contents of the Notepad can always be saved on file.

If in the middle of writing a note you need to do some calculating, then you can call up Sidekick's calculator. The notepad window is retained onscreen, and a picture of a calculator appears in the top right-hand corner. It has all the functions you would expect from a sophisticated business calculator, plus the ability to work in binary or hexadecimal arithmetic. This is a useful feature for programmers, and could be sufficient justification alone for buying Sidekick since *real* hexadecimal calculators are comparatively pricey.

As with all Sidekick facilities the calculator can be instantly accessed from any other software, so the hexadecimal facility is very useful when working with some of the standard debuggers. With the calculator it's possible to program one of the keys with the current numeric result, so if that key is ever subsequently used then it reproduces the number. This is an easy way of transferring numbers out of the calculator. When you have finished calculating, a touch of the EXIT key causes the calculator to be replaced by the original display and you return to whatever you were doing previously.

Sidekick also provides a calendar/diary facility. The workings of this option are certainly elegant and sophisticated, but I found it the least useful facility. I can see no reason to abandon my eminently portable old-fashioned pocket diary.

A more useful facility is the auto-dialer which can automatically dial, through your modem, any number in your telephone directory file. It can also recognise and capture telephone numbers off the screen left by previous applications — like a database system, for example.

Sidekick's final facility is simply an ASCII table — it displays all 256 characters together with their codes and other information. This may seem something of a make-weight facility, but it would be useful for anyone involved in software development.

Spotlight

Spotlight is produced by Software Arts, creator of the world-famous VisiCalc spreadsheet system. It offers slightly more facilities than Sidekick, and also costs rather more. The package is supplied as a spiral-bound manual plus disk, housed in a matt black box together with some extra leaflets. One of these leaflets is a Customer Support Plan, with a hotline telephone number in case you have any problems. My version has a US number, but I'm told the UK number is given now.

The supplied disk is copy-protected and must be present when the system is first loaded, but the copy protection does allow up to two backup copies to be made, one of which could be to a hard disk. You load the system in exactly the same way as Sidekick — nothing obvious happens, but a Spotlight facility can subsequently be invoked, at any time, by just a single keystroke.

Spotlight offers six facilities. It does not have the ASCII code chart, but otherwise covers all the Sidekick options. Two facilities not offered by Sidekick are the filer and the index card file.

The index card file can be called up by pressing the SHIFT, ALT and I keys. In general all Spotlight's facilities are brought up by a SHIFT-ALT combination, plus the initial letter of the task. The initial loading operation for Spotlight only loaded the minimal control software to intercept special keystrokes, and so on. This means that in every case, following the keystroke, the code for the required task must first be read from the disk before the task can start. There is an irritating delay before you can use it which completely destroys the feeling of spontaneity which you quickly appreciate with Sidekick.

When the index card filer is ready you are presented with a simple facility for compiling, viewing and searching index cards on the screen. The information on any given index card can be

entered in a free format, and the cards are sorted on the contents of their first line. There are two display modes — one displaying a single card, the other displaying the card 'index': that is, all the first lines. Up to 500 cards are allowed in any one list and up to 36 lists can be accommodated, assuming your machine has the capacity. These lists are stored in separate files and are completely unconnected with one another. Unfortunately each list is only identified by a single letter or digit rather than a more meaningful name, so it may be difficult to recall which index list you want.

Spotlight's filer facility is used for manipulating disk files. At first sight this may seem an even stranger inclusion than Sidekick's ASCII table, as it does not provide much that isn't already available through ordinary DOS commands. However, as Spotlight can be invoked in the middle of another activity, this feature provides the option of controlling disk files from within other software. This can occasionally be useful, but can also totally confuse the original program if you're not careful — for example, you might delete a file it assumes is present.

The other advantage of Spotlight's filer is that it might be considered more user-friendly. Inexperienced users, in particular, may prefer to manipulate files through menu control rather than typed commands at the keyboard.

The notepad facility does not conform to the WordStar keystroke conventions, which can be seen as either an advantage or disadvantage depending on your opinion of WordStar. Like Sidekick the notepad has limited capacity (eight pages) but unlike Sidekick this cannot be increased.

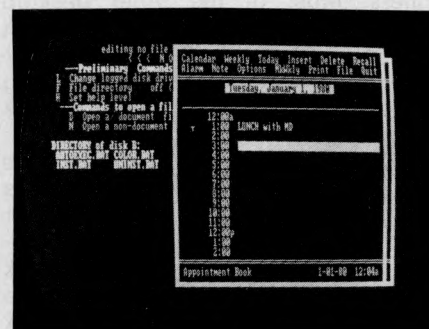
The calculator facility is functionally similar to Sidekick's but does not have a hexadecimal or binary arithmetic option.

Spotlight's phone book is really an alternative presentation of the index card filer. If name and number are placed on the first line of a card, the information will be sorted, and numbers rapidly looked up by viewing the cards in index (first line only) mode. Spotlight does not have an auto-dial facility.

Spotlight's appointments book stands a slightly better chance of prising me away from my trusty diary. It



The Spotlight calculator



The diary has an alarm facility

has special facilities for setting up weekly meetings and offers an optional alarm—not to wake you up at the end of a meeting, but to alert you to the fact that one is about to start! The alarm sounds whatever you're doing even if you're not using Spotlight at the time, as long as the computer is switched on.

QED+

QED+ is the only British product of the three. The name is a mnemonic for Quantec Executive Desk, Quantec being the author of the system. Quantec aimed to produce a software package to perform all the personal management tasks that have hitherto been carried out manually, and accordingly it offers a few more facilities than Sidekick and Spotlight. It has a rather more substantial manual and, yet again, a copy-protected disk.

The operation of QED+ is rather more conventional than the other two. When the system is first loaded, it does not simply disappear but displays a menu of the main options. One of these options allows you to set up up to 10 different program names, and then run one of them. It's possible to return to QED+ from that program at any time with just a single keystroke, ALT, and function key 10. The original program can be resumed where you left off by repeating the keystroke. This facility is clearly less flexible than the others and would not be favoured by software developers, for example. However, the system is clearly aimed at business managers who might very well prefer this type of menu control.

Quantec also supplies QED, which is identical to QED+, but without any facility to run other software.

Many of the areas covered by QED+ will be familiar: diary, calculator, address book, and so on. But one of the most surprising inclusions is that of a critical path analysis facility, or project planner as it is sometimes known.

Critical path analysis (CPA) is an invaluable management tool that can be used for scheduling and progress-chasing projects. Unlike most of the desktop applications I have seen, CPA is generally available as a standalone product from a wide variety of suppliers. Most of the other desktop applications are too trivial to enjoy that status.

QED+ provides facilities for building up critical path networks on 'task pages'. A task page specifies a task (for example, recruitment) in terms of its duration, and in terms of the other tasks that must be completed before it (for example, rent new offices). QED+ imposes various limitations on network size (a maximum of 150 tasks) and the number of tasks that can precede a task is six. For each task the points of interest are when it can start and finish, and if



SCREENTEST

there is any slack time (because it is waiting for some other preceding task). QED+ displays all this information on a task page and also provides a barchart display, which gives the same information graphically.

QED+'s desk filing system is considerably more complex and powerful than Spotlight's index card filer, and Sidekick has no equivalent at all. It hinges on the idea of a 'form', which you can design to your own specification. Quantec used this facility itself to create some of the other applications for QED+, such as the address book. A form is built up with boxes on the screen, where information is destined to be entered. The type of information for each box can be specified for validation purposes.

Like its rivals, QED+ offers a calculator, diary, address book and telephone facilities. It has a day book and event file which automatically update the diary, and a number of other sophistications. Like Sidekick it has an auto-dialling facility, but as QED+ is a British product users should not anticipate any problems dealing with our telephone system. Among other things you can set up the auto-dialling to cope with a local

PABX: that is, it will precede the number with a 9.

QED+'s Notepad facility is weaker than the other two products, being confined to free-form notes entered in a box on a form. Quantec excuses this on the grounds that a manager would prefer to use a word processor for notes.

Conclusion

Of the three systems, Sidekick emerges as excellent value for money. If you hold the view that many of the applications covered by desktop managers are tending towards the trivial, then Sidekick's price seems about right. It was also much the easiest to use, and only in part because it offers fewer facilities. Quite simply it's just very well engineered.

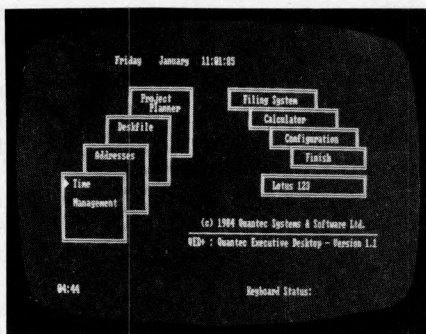
Sidekick may also have a special appeal for programmers with its hexadecimal calculator, ASCII table and excellent text editor—which is almost identical to the text editor released with Borland's Turbo-Pascal.

QED+ takes a much more serious view of desktop management. It has a heavyweight feel about it which makes it more difficult to use, but it does attempt to address itself squarely at the manager looking for software to help with his daily work.

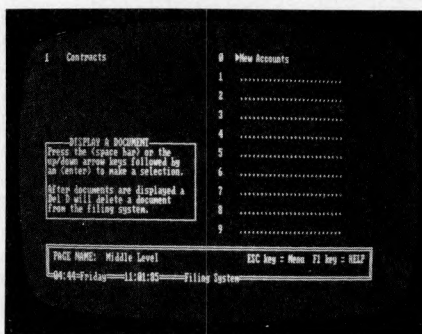
The critical path analysis alone makes it worth the price, and the other multiple features could be considered a bonus.

Spotlight falls between two stools. It's certainly no better than Sidekick, but costs rather more.

END



The QED+ menu



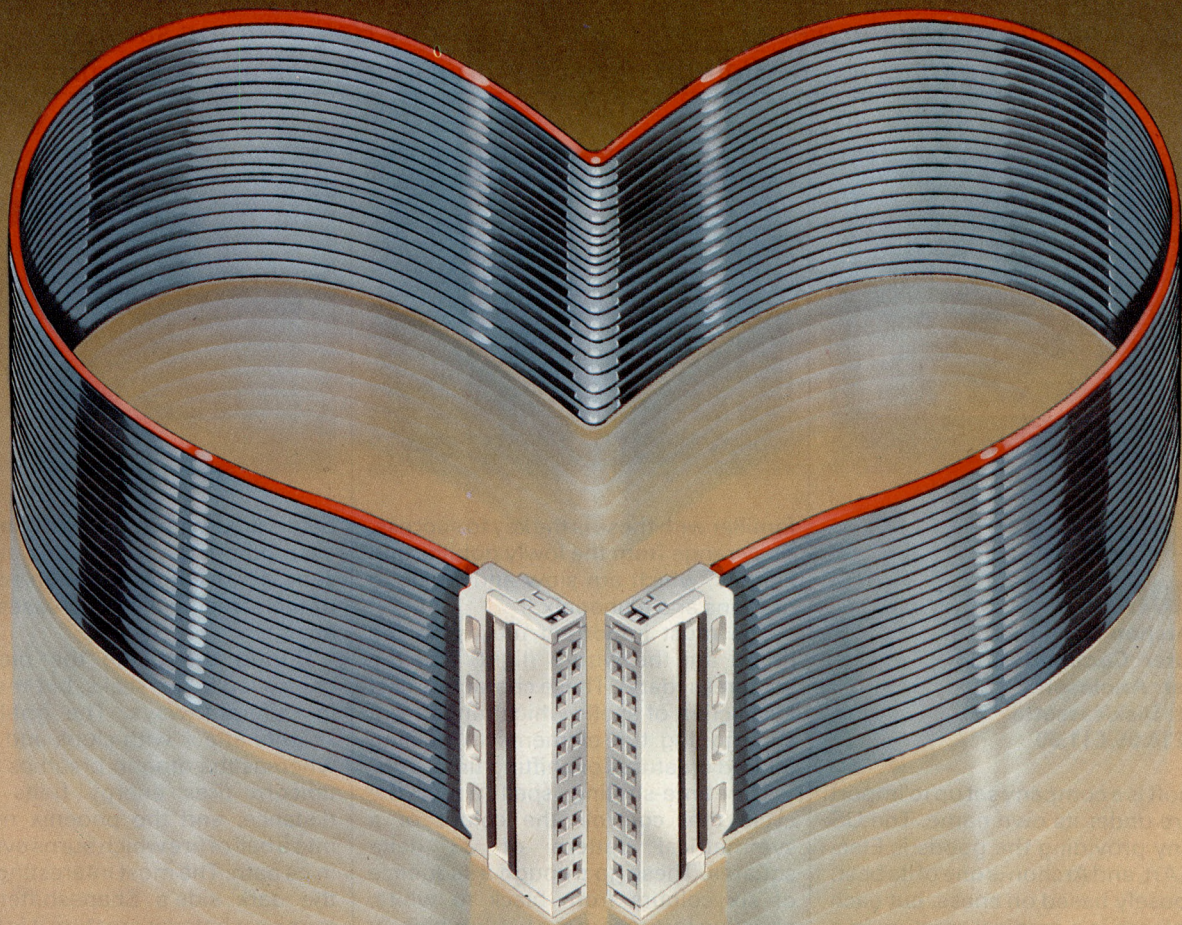
QED+ filing system menu

Summary

Appointment book/diary
ASCII table
Calculator
Critical Path Analysis
DOS Filer
On-line Help
Index Card File
Note Pad
Phone/address book
Autodial
Price (ex VAT)

Sidekick	Spotlight	QED+
Yes	Yes	Yes
Yes	No	No
Yes	Yes	Yes
No	No	Yes
No	Yes	No
Yes	Yes	Yes
No	Yes	Yes+
Yes	Yes	Yes
Yes	Yes	Yes
Yes	No	Yes
£50	£125	£295

WHY MICROS LOVE MT80



Most leading low cost Micros, eg BBC, Dragon and Sinclair QL love the MT-80 printer from Mannesmann Tally. It is fully hardware compatible and with a range of cable options, gives trouble-free straight through plug-in facilities.

You'll love it too, for its sophisticated looks, and its range of *standard features*, which include 80 col, 80 cps optimised bi-directional printing with dot addressable and line graphs, quick tear-off facility, friction and tractor feed, and easy change cassette ribbon. And all for an ex-VAT price of around £200.

Options include <55dBa sound reduction kit and 2K buffered serial interface.

The dealer who supplies you is supported by Mannesmann Tally, Europe's leading printer manufacturer. Your guarantee of continued support and assistance throughout the life of the printer.



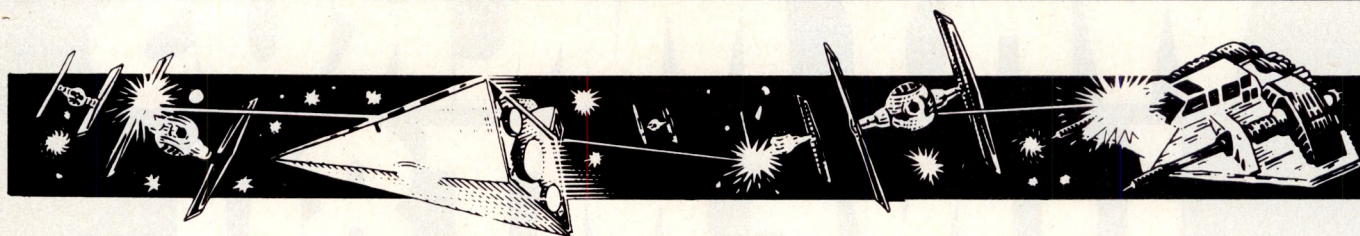
Ask your nearest dealer for a demonstration, or phone us today for full details. Either Annie, Sali, Terry or Geoff will be only too pleased to help you.



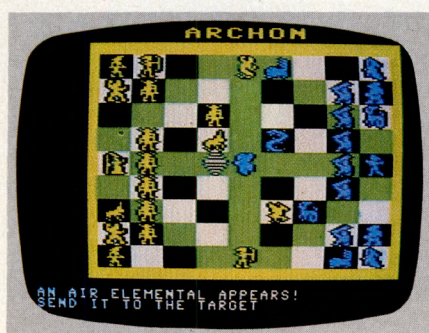
MANNESMANN TALLY
THE FIRST NAME IN PRINTING

Mannesmann Tally, Molly Millar's Lane, Wokingham, Berkshire RG11 2QT
Telephone (0734) 791619/791533 Direct Lines or (0734) 788711 Switchboard

SCREENPLAY



There's more than one way to play chess in this month's pick of the best, and either way the pieces aren't friendly. But Tony Hetherington survives to review games for the Commodore 64, Apple Macintosh and Spectrum.



One night in Archon

Title: Archon
Computer: Commodore 64
Supplier: Ariolasoft
Format: Disk/cassette
Price: £14.95/£11.95

Ariolasoft is a company set up to import software under its own name. The US company providing the goods is Electronics Art, and Archon is one of its best.

It's loosely based on chess, but each of the pieces is a magical creature in a fight between the forces of good and evil. Each creature has its own strengths and abilities, and becoming

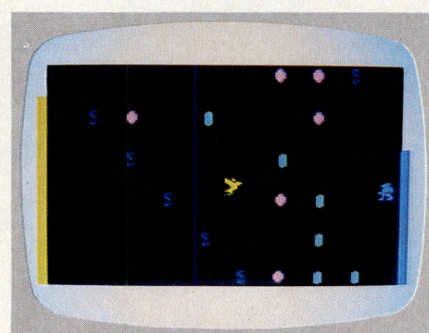


familiar with these is the key to success. They range from the lowly goblins and knights, which are slow and weak, to dragons and a phoenix.

The most important pieces on the board are the wizard (light) and the sorceress (dark). These characters cast a selection of spells which range from summoning the elements to healing injured creatures or shifting time.

The time-shifting spell alters the cycle that controls the colour of a symmetrical pattern of 33 delta squares. These go through a sequence of six colours from black to white, affecting fortunes in the battle which, in Archon, you have to fight if you want to take a piece.

When this happens, play shifts to a



battle area where the two pieces face each other. Their strengths are represented by a coloured bar on either side of the screen which decreases as they are hit.

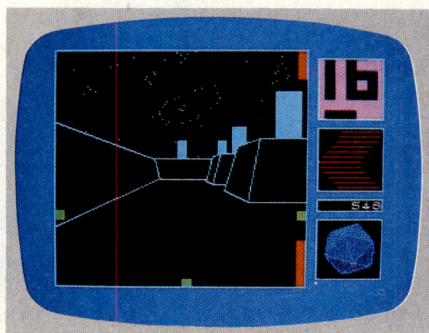
During the battle the pieces are controlled by joysticks, but they attack in different ways. The goblins and knights attack with clubs and swords, whereas the dragon breathes fire. The unicorn fires energy bolts from a distance, and the phoenix mobilises into a ball of fire which burns everything in its path. The most interesting piece is the dark side's Shapeshifter, which mimics whatever creature it is fighting.

You can either enjoy playing Archon against another player or be slaughtered by a computer opponent.



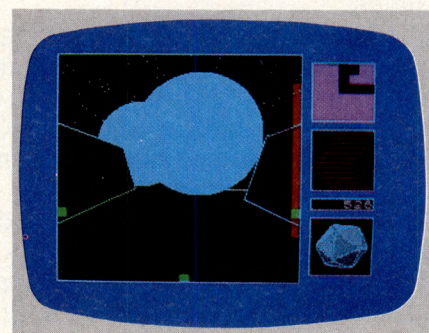
The prize is right

Title: Hedron
Computer: 48k Spectrum



Supplier: Firebird
Format: Cassette
Price: £9.99

Hedron is described by Firebird as 'the most challenging computer game ever written.' It is also a competition; those



skilful enough to complete it will qualify for a tournament, with a Porsche 924 as the prize. But I wouldn't sell the old banger yet as it's a difficult game to play.

In essence it's a maze game in which you are a hedroid dropped into the

maze to destroy an enemy computer. This is not an easy task. The computer is defended by laser-shooting towers and 56 menacing white spheres that are reminiscent of the guardians in The Prisoner.

The spheres trundle around the maze, and are both deadly and impervious to your attack. They also impose a time limit on your efforts for, after a while, they will move into positions that make some routes impossible.

The towers, however, provide a more immediate danger as they shoot to kill

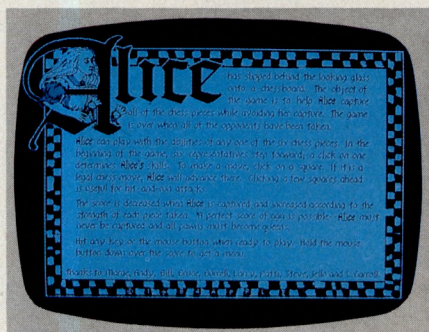
on sight. They can be killed but only from behind. Unfortunately the chances are that when you kill one it will reappear elsewhere, as well as changing the direction of a few others.

To help you find your way around the maze, a 3D image is to the right of the main display. Below this map is a helix-shaped damage display, with the number of lines illustrating your current state of health.

Below that is a timer which is synchronised with the sphere movement, and finally, my favourite — a

rotating hedroid which is colour coded to show the region of the maze that you are in. There are 12 regions and consequently 12 colours, which is quite an achievement on the eight-colour Spectrum. It is attained by mixing the existing colours to create shades of salmon, turquoise, gold and lilac.

These additional colours are just an example of the technical expertise that created this game. Add to that smooth scrolling, and not only have you got an enjoyable game, but a serious contender for the Game of the Year award.

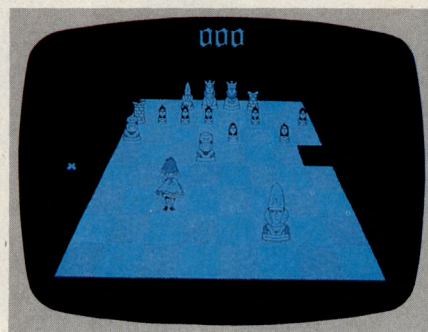


Wonderland chess

Title: Alice Through the Looking Glass
Computer: Apple Macintosh
Supplier: Apple
Format: Disk
Price: Approx £30

Alice is the first games program I've seen for the Macintosh. It's a chess variant in which you play Alice against a Wonderland chess set.

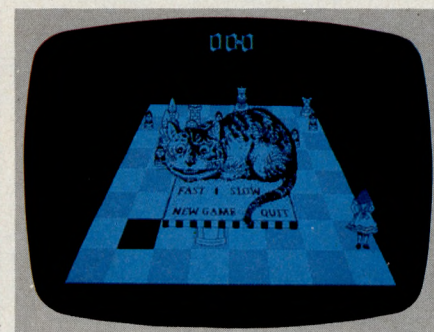
You start the game by selecting the piece that you wish Alice to mimic. Most people will head straight for a queen but



for a real challenge you should try one of the lesser pieces. To move your piece, you move a mouse-driven cursor to the required square and press. The game isn't played in set turns, so if you stop and think you'll be clobbered.

Luckily you are quickly resurrected and the action continues. The best strategy I have found is to click in several moves in advance, but you must have the mouse ready for when things go wrong. For example, avoid the hole that moves around the board swallowing pieces.

Your performance is rated by a score



which is increased when pieces are taken, but points are deducted for a hammering. The theoretical maximum is 999 but to achieve this you must take all the opposing pieces, including the pawns once they have been promoted to queens, without being hit. But the prospect of nine queens is somewhat daunting.

Alice is an extremely professional, well presented game. Although the review copy was described as being pre-production, the game was supplied in mock book cover complete with velvet-like inlay and ribbon.



The great space hype

Title: The Great Space Race
Computer: 48k Spectrum,
Commodore 64
Supplier: Legend
Format: Cassette
Price: £14.95

The policy behind Screenplay is to review only the best games. However, The Great Space Race has been hyped

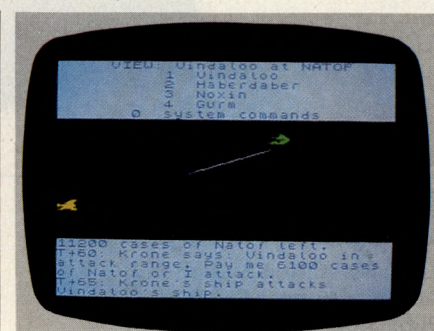


so much that we had to look at it.

According to the hype, it was to feature movie-style graphics in a game that was to follow BMA award winner Valhalla.

Unfortunately the game falls sadly short of the hype, and the movie-style graphics are a nuisance: they interrupt the flow of the game.

You deal in a particularly potent brew called Natof which is coveted throughout the galaxy. Unfortunately you can't deliver the stuff yourself, so you have to hire traders from a motley bunch of drunks, psychopaths and crooks. These



characters are more likely to drink the stuff themselves than deliver it.

Your problems increase with the intervention of pirates and the galactic police who want their share, not to mention the other racers.

The fight sequences are particularly disappointing. They merely consist of drawings leaping unrealistically around the screen with the occasional line drawn between them. Also, the use of Basic makes the game slow.

The Great Space Race has an interesting plot, but is badly let down by its implementation. **END**

BIBLIOFILE

From a vast tome on Symphony to the latest coffee table, computer graphics book — David Taylor casts his eye over this month's literary choice.



Symphonic key

Title: Mastering Symphony
Author: Douglas Cobb
Publisher: Sybex
Price: Not available

It's not as if purchasers of Symphony are short of something to read. This whopping packages (six floppies, needing no fewer than 320k or RAM just to boot) comes in a small plastic suitcase containing a 438-page Reference Manual, a 308-page How-To Manual, a further fat Introduction Manual, a separate Glossary and a Quick Reference Guide. To this manual mountain, and to America's massive range of Symphony manual re-writes, Mr Cobb now adds another 760 pages and, if you weaken, will sign you up for his monthly *Symphony User's Journal*, too. 'Pati-

ence is one of the keys to learning Symphony,' he asserts. You might need a good optician, too.

Symphony is at heart a spreadsheet, points out Mr Cobb, but not just any old spreadsheet. The act it has to follow is Lotus 1-2-3 with its half a million devotees. Once, way back in 1983, that was the IBM PC's most powerful piece of figure-crunching software and an instant bestseller worldwide. Symphony has to surpass it and, moreover, has to compete with such robust rivals as Framework and Open Access.

All combine awesome spreadsheet power with the current fashion for integrated graphics, word processing, database management and (all-American) communications. All take ages to get to know inside-out.

No question but that Cobb, author of a similar big-selling tome on Lotus

1-2-3, knows the score on Symphony, or that he believes it to be the bee's knees. His text is commendably lucid, if wide-eyed at the wonder of it all. Not a whisper of any Symphonic shortcomings (such as the fact that the comms package supports only two modems, neither usable in Britain) and lots of praise for the word processor which is OK but scarcely any match for the best wp-only packages like Microsoft's Word or Samna.

Still, *Mastering Symphony* is as thorough-going as it is uncritical and as such is a useful adjunct to the Lotus texts, good as they are. Cobb's next job, presumably, will be to set about another brick-sized book for Symphony customers planning to use the extra speed and memory of a PC-AT. I feel for Mrs Cobb who, as is acknowledged at the start of this book, wondered if she

would ever see her husband again.

All graphics and gloss

Title: Creative Computer Graphics
Authors: Annabel Jankel and Rocky Morton

Publisher: Cambridge University Press

Price: Not available

A captivating book, this, of the kind to be savoured over a pot of strong coffee and a box of thin mints. It's a picture book, as glossy as they come, with a bit of text attached to outline the history, the techniques and the applications of computer graphics at their most visually (and expensively) stunning. The disjointed text isn't that wonderful, but the pictures are.

Jankel and Morton met at art school ten years ago and now run a video outfit called Cucumber — TV commercials are a speciality. It's a pity, they say, that while inspired computer graphics are now accepted as an everyday tool for ads, for TV station identity sequences like the tumbling coloured bricks of Channel 4, or for animated titling like the opening sequence of *Weekend World*, no enterprising TV producer has yet risked a programme to exploit the entertainment value of sophisticated computer graphics for their own sake — a sort of Computer Graphics Showcase.

This book ought to persuade someone in TV to give it a go. It collects images from feature films, from scientific simulations, from industry and design, from computer graphics as experimental art and, of course, from computer games. It's a rare collection with some breathtaking stuff. Only a tiny proportion of what's shown relates directly to the humble home micro, but the authors are much encouraged by the recent trend towards high-power, low-cost machines (like the QL and BBC plus 16032 second processor) and can't wait for the imminent wizardry of wall-sized TV screens and laser-driven home holographics.

Still staring at the best of this book, neither can I.

Thinking machines

Title: Artificial Intelligence: Human Effects

Editors: M Yazdani and A Narayanan
Publisher: Ellis Horwood (John Wiley)
Price: £22.50 (hardback) £12.50 (paperback)

Artificial Intelligence, according to an authority named Minsky, is the science of making machines do things that would require intelligence if done by men.

It is also, according to Yazdani and Narayanan, a hot potato. In America, AI is a respectable area for academic research and, with the increasing popu-

larity of so-called Expert Systems (sophisticated software for use in place of human expert opinion) Americans are now taking a close commercial interest in AI besides. The Japanese, with their Brave New Vision of fifth generation computers running the whole human show, are equally intense with their AI deliberations. Over here, the whole vexed subject is still a bit, well, *suspect*.

It isn't that we're short of boffins. Thanks to such Governmental initiatives as The Alvey Directorate, researchers need not be short of cash either. Nevertheless, it is suggested that we British tend to come at the idea of AI with typical reserve, thinking machines don't seem to strike us as quite *respectable*.

Masoud Yazdani and Ajit Narayanan are lecturers at Exeter University (the former familiar to Electron users who get his guide to programming in the Acorn box). They are thus academics and no doubt thoroughly respectable. There's no mistaking their studiousness as here they assemble a collection of learned, and at times stupefyingly impenetrable papers by more academics, (many from Exeter), on the whole intractable subject of what exactly Artificial Intelligence is and where it might or might not be taking us. Their purpose, they stoutly maintain, is not to draw conclusions — merely to encourage lively debate.

Debate we do get but lively it's not. We get discourse on the computer in medical diagnosis or legal counsel. We get a discussion on the social and philosophical implications of AI. AI methodology is examined, AI in education looked at. It sounds interesting enough, but it would take a computer with a brain the match of Einstein's to unscramble some of the contributors' lead-weighted style: 'We consider that one of the biggest blocks to a healthy interaction between psychology and AI is what Pettitt has called AI-centricity. A common conceptual error of the AI-centric is the naive belief in a simple dichotomy between what Miller calls theory development and theory demonstration . . .'.
There is a tremendous amount of thought-provoking, not to say brain-twisting argument and counter-argument in this book, but it is strictly for those who can get along with academic writing at its knottiest.

The last word ought to go to Narayanan, who frankly states: 'We have raised many questions. A cynic could well argue that current research in AI is doing nothing more than providing jobs for a small but expanding elite in esoteric, specialist topics or large, defence-oriented areas, with there being little hope that the vast majority of us will ever benefit in some concrete way from the research, where by *benefit* we mean an accepted and proven gain rather than one which is advertised as being a gain by the elite

who spend our money researching into it. The cynic may well have a valid point.'

Second best

Title: Inside Apple's ProDOS

Author: John Campbell

Publisher: Reston (Prentice-Hall)

Price: £18.40 (paperback)

ProDOS, bubbles Mr Campbell, is Apple's exciting new disk operating system with new commands, expanded and improved old commands, file management utilities, assembler, data types, file types and new procedures — everything anyone could ask for the Apple II family.

True enough, I suppose, but what is undoubtedly a damn sight more exciting is Apple's new family of Macintosh computers.

Still, this book is only for those who are stuck with early Apples and looking for an improvement on their DOS 3.3 capability. They should like it. Campbell describes in patient detail all that ProDOS is and does, and attaches examples and listings. I couldn't fault it but I can't pretend I found it an absorbing read. I dare say the same would go for any Apple user who's laid hands on the incomparable Mac.

Suggested recipe for Commodore 64

Title: Commodore 64 Subroutine Cookbook

Author: David D Busch

Publisher: Prentice-Hall

Price: £7.95

If you have a Commodore 64, a sound knowledge of its Basic, enjoy writing your own programs and have £7.95 to hand, you shouldn't hesitate. This little book spells fun.

What Busch does is provide a set of machine-specific subroutines for you to merge into your own listings (some will run on their own) and thus provide instant tricks like sound effects (gunfire, klaxons) an elapsed timer, joystick subroutine, colour peeker, games routines, or small-time business and financial add-ons that will calculate interest rates or simply tidy up display formats.

There are some 70 such 'recipes' — some trivial, some patching up the gaps in Pet 2.0 Basic, a few providing useful comms support, but it's all rather Heath Robinson when set alongside more modern machines. Commodore 64 users generally have my sympathy, but as I was reminded the last time I was a bit sniffy about this machine, there are an awful lot out there and thousands swear by them. For them, if for no-one else, I can unhesitatingly recommend this book.

END

TJ'S WORKSHOP



Our monthly pot-pourri of hardware and software tips for the popular micros. If you have a favourite tip to pass on, send it to TJ's Workshop, PCW, 62 Oxford Street, London W1. Please keep your contributions concise. We will pay £5-£30 for any tips we publish. PCW can accept no responsibility for damage caused by using these tips, and readers should be advised that any hardware modifications may render the maker's guarantee invalid.

SPECTRUM BASIC REMOVER

This program will remove all, or least part of, a Basic program, but will leave the variables unharmed; thus it becomes possible to change Basic programs but retain the same variables. This is most useful if you use programs which run off the same data. It's not always possible to merge such programs directly, but with one program removed the second can be merged with the first's variables.

This machine code can go anywhere in RAM — I find it best above RAM top. Users who don't have an Interface One should be able to convert it using the PRINT USR system.

If you have a hundred-line Basic program, and you wish line 50 onwards to be removed, then all you do is

load the HL register pair at USR #R to hold the value 50. If you wish all the program to be removed, then load the HL register with one.

The USR function has been selected to act as the adapted calling command. The USR command, and all commands which immediately follow it, should be located on one multi-statement line; this should be the first line in the program.

If you don't have an Interface One, then remove lines 10 to 240, and lines 280,290,540 and 550. Change the DEFWs' at lines 300 and 560 to Call instruction's, then change the jump instruction at 580 to a RET instruction.

The enclosed Basic program is designed to allow the user to place the program above RAM top, then save it to tape. The data contains the code for the full listing of the machine code program.

Nigel Mossman

```
00010 ;basic removal routine
00020 ;using extended basic via
00030 ; INTERFACE ONE
00040      rst    smrom      ; select ma
00050 ;                in rom
00060      defw   get#        ; collect
00070 ;                next char
00080 ;                actor
00090      cp     usr         ; is it usr
00100      jr    z,usr#      ; jump if
00110 ;                it is
00120      jp     syer        ; else synt
00130 ;                ax error
00140 usr#    rst    smrom      ; select ma
00150 ;                in rom
00160      defw   next#       ; get next
00170 ;                character
00180      call  syfin        ; advance
00190 ;                to end &
00200 ;                exit if
00210 ;                checking
00220 ;                syntax
00230 ; the above is not needed when not
00240 ; using interface one
00250 usr#r    ld     hl,100    ; 1st line
00260 ;                to be del
00270 ;                eted
00280      rst    smrom      ; select ma
00290 ;                in rom
00300      defw   addsea      ; call main
00310 ;                rom to fi
00320 ;                nd start
00330 ;                of line
00340      push  hl          ; save a co
00350 ;                py
```

```
00360      push  hl          ; transfer
00370      pop   bc           ; bc
00380      ld    hl, (vars)   ; collect
00390 ;                address
00400 ;                of variab
00410 ;                les
00420      scf              ; set carry
00430 ;                flag for
00440 ;                correct
00450      ccf              ; subtract
00460      sbc   hl,bc        ; find numb
00470 ;                er of byt
00480 ;                es to re
00490 ;                claim
00500      push  hl          ; transfer
00510      pop   bc           ; to bc
00520      pop   hl          ; drop addr
00530 ;                ess of line
00540      rst    smrom      ; select ma
00550 ;                in rom
00560      defw   recbas      ; remove
00570 ;                basic
00580      jp     finish      ; exit in
00590 ;                run time
00600 prog    defl  23635
00610 vars    defl  23627
00620 addsea  defl  0196eh
00630 recbas  defl  019e8h
00640 smrom   defl  010h
00650 get#     defl  018h
00660 usr      defl  192
00670 syer     defl  496
00680 next#    defl  020h
00690 syfin    defl  005b7h
00700 finish  defl  005c1h
```

```
1 REM basic loader for delete routine
10 FORMAT "t";9600: OPEN #4;"t"
20 INPUT "input start address";start:
LET b=INT (start/256): LET a=start-b*
256: PRINT a,b: POKE 23735,a: POKE 23736,b
30 CLEAR start: INPUT "start address?";start:
FOR a=start TO start+40: READ c: POKE a,c:
NEXT a
60 DATA 215,24,0,254,192,40,3,195,240,1,215,32,
0,205,183,5,33,100,0,215,110,25,229,229,193,
42,75,92,55,63,237,66,229,193,225,215,232,
25,195,193,5
70 SAVE "BASIC REM" CODE start,40
99 USR
```

QL WILD CARD FILE SPECIFICATION

A surprising omission from the QL QDOS operating system is the means to refer to files collectively by the use of wild card characters. For example, all microdrive operations (for example, DELETE or COPY) involve specifying filenames

individually, which may be fine for a few files on cartridge, but what happens when the promised hard disk arrives? Trying to back up all or part of a hard disk one file at a time would be virtually impossible.

Users of most other operating systems are much more fortunate. Those who are accustomed to CP/M will be familiar with the following conventions: the symbol '?' is taken to match any single character, while the symbol '*' is taken to match any

group of characters.

Furthermore, in CP/M a filename can have a three-character suffix separated from the main part by a full stop. QDOS also allows this, but uses an underscore character as a separator. The idea of wild card identifiers can therefore be extended.

It can be seen that this system provides a convenient way of referring to Quill, Archive, Easel and Abacus files as a group. The program uses these concepts to provide a powerful and selective DELETE and COPY facility. When this program has been entered, typing 'XD' enters the delete routine. You will be asked to give the microdrive number, and a directory listing will appear in a window on the right of the screen. You must then specify

the characters to be matched, and you have the option to confirm the files individually or to have them all deleted automatically. For example, to delete all Quill files type 'XD', then '1' (if microdrive one is wanted), then '*_doc'.

Typing 'XC' enters the copy routine. This is similar to 'XD' but you'll need to specify the 'from' microdrive and the 'to' microdrive. For example, to do a total cartridge back-up from drive one to drive two, type 'XC', then '1', then '2', then '*_*'.

Michael Bryant

```
100 DEFine PROCedure xc
110 WINDOW 268,200,32,16
120 CLS
130 PRINT"File copy routine"
140 INPUT"Give the number of \"the 'from' drive ";drive1
150 dirtoscn drive1
160 INPUT"Give the number of \"the 'to' drive ";drive2
170 INPUT"Give the character \"string to be \"matched ? ";name$
180 xcopy name$,drive1,drive2
190 END DEFine xc
200 DEFine PROCedure xcopy(name$,drive1,drive2)
210 fileopen drive1,drive2
220 REPEAT fileread
230 INPUT#4,a$;
240 b$=a$
250 IF NOT b$="temp_tmp" AND namematch(name$,b$) THEN
260 filecopy=1
270 IF confirm THEN
280 PRINT"Shall I copy file \"a$;\" (y/n)?"
290 filecopy=reply
300 END IF
310 IF filecopy THEN
320 PRINT"Copied ";a$
330 DELETE "mdv"&drive2&"_ "&a$
340 COPY "mdv"&drive1&"_ "&a$ TO "mdv"&drive2&"_ "&a$
350 END IF
360 END IF
370 IF EOF(#4) THEN
380 CLOSE#4:DELETE tempfiles
390 dirtoscn drive2
400 EXIT fileread
410 END IF
420 END REPEAT fileread
430 END DEFine xcopy
440 DEFine PROCedure xd
450 WINDOW 268,200,32,16
460 CLS
470 PRINT"File delete routine"
480 INPUT"Give the number of \"the drive ? ";drive
490 dirtoscn drive
500 INPUT"Give the character \"string to be \"matched ? ";name$
510 xdelete name$,drive
520 END DEFine xd
530 DEFine PROCedure fileopen(d1,d2)
540 PRINT"Accessing drive ";d2
550 tempfiles="mdv"&d2&"_temp_tmp"
560 OPEN #4,tempfiles
570 DIR#4,"mdv"&d1&"_ "
580 CLOSE#4
590 PRINT"Confirm individual \"files (y/n) ?"
600 confirm=reply
610 OPEN#4,tempfiles
620 INPUT#4,a$;
630 END DEFine fileopen
640 DEFine PROCedure xdelete(name$,drive)
650 fileopen drive,drive
660 REPEAT fileread
670 INPUT#4,a$;
680 b$=a$
690 IF NOT b$="temp_tmp" AND namematch(name$,b$) THEN
700 filedelete=1
710 IF confirm THEN
720 PRINT"Shall I delete \"a$;\" (y/n)?"
730 filedelete=reply
740 END IF
750 IF filedelete THEN
760 PRINT"Deleting ";a$
770 DELETE "mdv"&drive&"_ "&a$
780 END IF
790 END IF
800 IF EOF(#4) THEN
810 CLOSE#4:DELETE tempfiles
820 dirtoscn drive
830 EXIT fileread
840 END IF
850 END REPEAT fileread
860 END DEFine xdelete
870 DEFine FuNction namematch(file1$,file2$)
880 REPEAT position
890 lenfile1=LEN(file1$):lenfile2=LEN(file2$)
900 pos1=" INSTR file1$:pos2=" INSTR file2$
910 IF pos1 AND pos2 THEN EXIT position
920 IF NOT pos1 THEN file1$=file1$&" "
930 IF NOT pos2 THEN file2$=file2$&" "
940 END REPEAT position
```

```
950 string1=file1$(1 TO pos1-1)
960 string2=file2$(1 TO pos2-1)
970 totmatch=checkchars(string1$,string2$)
980 string1=file1$(pos1+1 TO lenfile1)
990 string2=file2$(pos2+1 TO lenfile2)
1000 totmatch=totmatch+checkchars(string1$,string2$)
1010 IF totmatch=2 THEN
1020 RETURN 1
1030 ELSE
1040 RETURN 0
1050 END IF
1060 END DEFine namematch
1070 DEFine FuNction checkchars(string1$,string2$)
1080 IF string1$="" OR string2$="" THEN RETURN 0
1090 REPEAT expand
1100 IF LEN(string1$)=LEN(string2$) THEN EXIT expand
1110 string1$=string1$&" "
1120 END REPEAT expand
1130 match=1
1140 FOR i=1 TO LEN(string1$)
1150 IF i>LEN(string2$) THEN match=0:EXIT i
1160 IF string1$(i)="" THEN EXIT i
1170 IF string1$(i)="" THEN NEXT i:EXIT i
1180 IF NOT string1$(i)=string2$(i) THEN match=0:EXIT i
1190 END FOR i
1200 RETURN match
1210 END DEFine checkchars
1220 DEFine FuNction reply
1230 key=CODE( INKEY$(-1))
1240 IF key=89 OR key=121 THEN
1250 RETURN 1
1260 ELSE
1270 RETURN 0
1280 END IF
1290 END DEFine reply
1300 DEFine PROCedure dirtoscn(drive)
1310 OPEN#4,scr_180x200a300x16
1320 CLS#4
1330 PRINT#4,"Directory of \"drive mdv";drive:PRINT#4
1340 DIR#4,"mdv"&drive&"_ "
1350 CLOSE#4
1360 END DEFine dirtoscn
```

AMSTRAD DISPLAY TIPS

TAG — extremely useful for printing literally anywhere on the screen. However, the printing is done with the graphic pen, and what the Manual doesn't make clear is that if you want to PLOT or DRAW in one colour, then TAG and PRINT in another, you need to PLOT x,y,new col (where x & y are offscreen), MOVE back to where you were, then PRINT. This also means that you might have to restore your previous coordinates and colour to continue with PLOT or DRAW. COLOURS — there are 32 available (see chapter nine page four of Manual). As numbers 27-31 duplicate five existing colours, only 27 are mentioned elsewhere. Nevertheless, commands such as BORDER 29 are valid. CONTROLS — characters 0-31 (except 0 & 13) can be embedded in PRINT statements, saving quite a bit of space. For example, try PRINT"[CTRL L] TEXT" instead of CLS:PRINT "TEXT", or PRINT"[CTRL G]" to produce BEEP. NOTE: INK & BORDER (chrs 28 & 29) should be followed by the ink number and two values, both the same if flashing isn't required. If only one value is used, flashing with the value set previously will result. HORIZONTAL SCROLLING — as display is controlled by the 6845 chip, OUT 256.No. will move the whole screen area with the edges wrapping round. Here, 'No' is a displacement from the right

side, so that although OUT 256,20 moves the display by half a screen, OUT 256,39 will place the left margin at column two. COLOUR MASKING — use of CHR\$(22) with text and CHR\$(23) with graphics is one of the most powerful of the Amstrad's features but difficult, perhaps, for beginners to understand in terms of the results achieved. Bearing in mind what was previously said about the PEN results of bit combination in each mode, remember that overlapping pixel colours arise from a logical combination of PEN colours. Try this:

```
10 MODE 1:INK 0,0:INK
1,24:INK
2,2:INK 3,15
15 GOTO 30
20 PRINT CHR$(23);CHR$(1)
30 FOR X=300 TO 350 STEP
2:MOVE X,100:
DRAW 0,150,1:NEXT
40 FOR Y=150 TO 200 STEP
2:MOVE 250,Y:
DRAW 150,0,3:NEXT
Now delete line 15 and run again. Change INKs 1 & 3 from the keyboard and you'll see that the centre block of colour is unaffected, because the logic result from line 20 remains the same:
1 XOR 3=3
(&X00000001 XOR
&X00000011 =
&X00000010)
(remember this is 'double width' mode — take the STEPs out of lines 30 & 40 and watch the result!).
Last, but not least, a demonstration of 'hidden line' drawing, using the same example. Having deleted line 15, EDIT line 10 and change INK 2,2 to INK 2,24 and run.


Tony Mayne


```

END

COMPUTER ANSWERS

*Send your queries to Simon Goodwin, PCW, 62 Oxford Street, London W1.
Note that Simon cannot answer questions on an individual basis, so please
don't send an SAE with your query.*

Mixing your own paint

Is there any way I can use more than 16 colours on my Commodore 64? I can use extra colours, for example in sprites, but these must be chosen from the 16 available for background displays. I would like to be able to produce shading and graduated hues, as on an Atari or some of the new arcade machines.

Dave Waller, Canning Circus, Nottingham.

You're stuck with just 16 colours on a Commodore 64, although the new Commodore machines (the Plus/4 and the C16) allow the shading you describe. On an Atari every point displayed can have an 'intensity' (brightness) as well as a hue (colour); this means that shades of the same colour can be produced, giving the attractive results you mention.

The electronics of the Commodore 64 can generate only 16 different hue signals for the TV — these correspond to the standard poster colours you are used to. On a Spectrum there are only eight colours available but each can appear in bright or normal intensity, giving 15 possibilities (bright black looks exactly the same, however, as normal black; in fact the difference between bright and normal in most colours can be hard to distinguish).

On an Atari there are 16 colours, but each can be shown in a range of intensities — either eight or 16 different brightnesses, depending on which books you believe. Luckily there is a 'trick' which can enable you to produce the effect of extra colours. Imagine a block of colour on a TV screen, 20 dots wide by 20 dots high. 400 dots would be glowing, producing an area of colour, say, green. Now imagine that alternate rows in the block are set to black. You should have a grid of horizontal lines, but in fact what you get is a darker shade of green — the lines merge, spilling dimly into the black areas. The effect is destroyed if you look closely at the picture, but from a distance it looks as if you have produced a new colour.

The effect may be better if

you scatter the contrasting dots (which can be in any colour) throughout the area to be shaded in a chequerboard pattern. A red and yellow check will look orange, red and blue will look purple, and so on. This effect — a kind of computer tartan — can be used on any computer with a high-resolution display. It doesn't work on a low-resolution display or a video monitor since the dots don't merge. It's called 'stippling', named after a process used by some artists.

The Sinclair QL has built-in commands to generate stippled mixtures of its eight standard colours, giving the appearance of over 200 colours. Many commercial programmers use stippling on a variety of machines to generate shading and 3D effects.

Connection conventions

I recently bought a Dragon 32 computer but I can't save or load programs. The problem is that the cable which comes with the computer has small jack plugs at the cassette end, but my tape recorder, a Philips 3302A, expects DIN plugs. Is there any way I can use the tape recorder with the computer, or will I have to buy a new recorder? Andrea Husbands, Wrexham, Clwyd.

In theory it's possible to use the tape recorder just by changing the plugs at the end of the lead from the computer. You'll need a two-pin DIN loudspeaker plug in place of the EAR jack, and a three-pin DIN plug instead of the MIC jack. These go into the sockets marked with a picture of a loudspeaker and a digit (1), respectively. You'll need to experiment to find the correct way to wire up the two MIC wires to the three-pin DIN plug — one wire should go to the middle pin, and the other to one of the side pins.

In practice it may be more sensible to spend £10 or so on a low-cost, modern, cassette player with jack sockets already fitted. You don't need to buy a special 'computer compatible' model — most of these are just last year's flops tarted up with a tape counter and a few flashing lights. Some of them don't even

work reliably with common computers. You'll get just as good service from a cheaper, general-purpose model.

Some hi-fi recorders are useless with computers because they incorporate clever circuitry to 'process' the sound. This makes it sound better to the human ear but confuses a computer, for which raucous bleeps and buzzes have a special meaning.

The most common cause of unreliable loading is incorrectly set up tape heads. This is easily identified, since you experience problems loading other people's tapes (or pre-recorded ones) but your own tapes load perfectly. The misalignment corrects itself on your own tapes — you record them askew and read them back the same way.

Incorrect tape head alignment is a common fault on old machines. With heavy use or rough handling, the head, used to read a cassette, can move out of line, making music sound dull and data unintelligible to a computer. The more 'tinny' a recorder sounds, the better it's likely to work with most computer models. It is possible to re-align the heads on a tape recorder, but it's easy to make things worse rather than better unless you know exactly what you are doing.

Of course, it helps to clean and de-magnetise your tape heads regularly, using one of the kits available from most electrical shops, but this doesn't usually make a great deal of difference — computers are quite tolerant of dirty tape heads (except on a microdrive system). Incorrect alignment gives much greater problems.

Some hi-fi shops or electricians will re-align tape heads for you but prices vary widely, from about £2 to as much as £20.

Translation frustration

I have recently changed from a Sharp MZ-80A to a BBC Model B. This has meant that all the data I had on cassette for the Sharp's data-base is now incompatible with the BBC. As there is so much data on the cassettes it's impractical to type it out again if there is an alternative. What I would like to

be able to do is make the data compatible with a BBC data base.

Edward Wilding, Blaby, Leicestershire.

This is a very common problem, in business data processing as well as personal computing. Often companies use the same system for years rather than upgrade to a more useful or efficient one — they simply can't afford the cost of converting all their data from one format to another.

Curiously enough, the essence of the problem is the low cost of computers: it doesn't take very long before the data on a system is worth far more than the machine which processes it.

In your case there's no easy solution. Both computers use special-purpose hardware to generate or detect a cassette signal, and they each use a different approach to the storage of data.

Your Sharp cassettes will make no more sense to the BBC micro than a tape of Culture Club or Beethoven.

Data on a cassette is recorded as a series of clicks or tones. One pitch might correspond to a logic 1, and another to a logic 0, so that a stream of bleeps or clicks can correspond to a program, or a list of data items. The actual pitches or timings used will vary from one computer to another, influencing the reliability of the recording and the speed at which it can be read.

Your BBC Micro uses different tones and a different speed to the Sharp, so you can't just load the data as you would information recorded from another BBC. In fact, the Sharp data would be too fast.

Even if the tones were the same, the format might be different. This is the sequence in which data is recorded, the way file names and locations are handled, and so on. Every file contains extra information besides the data — its name, size, total value (for checking), and so on. These are recorded in different ways on various machines. There's no standard format since each choice has advantages and disadvantages in terms of complexity, flexibility, reliability and speed.

Some computers decode cassettes using software; a program might use simple

electronics to sense individual clicks on the tape. Software translates the pattern of clicks into a message. In such a computer it's possible to read 'foreign' tapes by loading a program which can decipher the timings and format used. This only works with a few computers: for example, it's possible to obtain programs to load TRS-80 data onto a Nascom, or ZX81 programs onto a Spectrum. Even these programs have some restrictions, and they are not able to convert all file types.

The BBC Micro uses hardware to decipher data on cassette. This makes it fast but inflexible — it can decipher only two formats (BBC Micro tapes at 300 or 1200 baud). The Sharp tapes conform to neither system, so they can't be read.

There is a standard way of transferring data from one computer to another, or to another device. The RS232 interface is a gadget which transmits characters, bit by bit, to any other device with the required circuitry. It is often used to communicate with printers, telephone modems, or other peripherals. Your BBC Micro has an RS423 interface, which can produce signals like an RS232. The RS232 is a two-way link, so you can transfer data either way between two computers equipped with the interface — at least, that's the theory the practice is more complicated and fiddly to put into action.

You will need an RS232 interface for the Sharp, and a cable to connect it to the RS423 socket on the back of the BBC Micro. If communication is impossible at first, turn the plug at the BBC end the other way up — the position varies depending which computer thinks it's 'in charge'. You should be able to print data from the Sharp down the RS232 cable, and input it into the BBC Micro. You'll have to read about the commands needed to control the RS232 interface at each end of the link. Once you've got communication underway you can write out the data to a BBC Micro cassette, although you may have to juggle it around a bit to convert it into the format expected by your database package.

Unless you understand a lot about both computers, or can find someone who does, it's much easier to re-type your data onto the new system.

Commodore assemblers

I have been searching through magazines looking for reviews of assemblers for the

Commodore 64. I don't have very much money, so £20 is about the most I am prepared to pay. Could you recommend a suitable assembler, bearing in mind my price limit and the fact that I am still using tapes?
Daniel Procida, De La Salle College, Malta.

There are a large number of assemblers available for the Commodore 64 on tape, disk and cartridge. Most of them allow all the standard features of assembly language — mnemonics, labels, and so on.

It's worth making sure, before you buy an assembler, that it conforms to a few basic criteria: it should be written in machine code (Basic assemblers are irritatingly slow); and it should be at least 'two-pass' — this means that you can refer to any label anywhere in your program. Other useful features are macros (facilities to refer to a group of instructions with one name) and built-in debugging commands (to allow you to adjust memory values, start and stop machine code programs, and so on).

There is a big problem associated with learning machine code on a cassette-based computer. When you make a mistake in a Basic program, the most common result is an error message. You can then adjust the program and run it again. But the same cannot be said for machine code programs. The majority of mistakes in machine code cause the computer to stop dead or crash completely, losing all the contents of its memory. In either case you can't fix the mistake until you have re-loaded your assembler program, instructions, debugger (if any) and re-assembled the code. This will take several minutes on a cassette system.

It's much more convenient to have your assembler on a cartridge, so that you don't have to re-load it from tape every time something goes wrong. This may cost a little more than you planned (Commodore's own assembler/editor cartridge costs £24.95 at the time of writing) but the extra money will be well spent — you'll save hours in the first week of serious use. Almost all professional Commodore 64 programmers use cartridge-based assemblers.

If you just want to get some idea of what assembly language is all about, you might as well start with a cheap and cheerful program on tape. Mushroom Software, 193 Rommany Road, London SE27 sells a two-three-pass assembler on cassette for just £5.50, plus £1 for overseas orders.

More Ace space

Last year I bought a 3k Jupiter Ace. I would like to expand the memory, but I understand that the manufacturer of the computer, Jupiter Cantab, has gone out of business. None of the shops near my home stocks accessories for the Ace. Is there anywhere I can still get a RAM pack for my computer? Could I plug in the 16k RAM pack from my ZX81?

John Dewhurst, Middlesbrough, Cleveland

The expansion port on a Jupiter Ace carries the same signals as a ZX81 RAM pack. However, the signals are wired on the port in a different order, so you'll need an adaptor to enable the two devices to work together.

Despite the death of Jupiter Cantab there are still a few firms supplying Ace enthusiasts. The stocks of the Jupiter Ace, and add-ons, are now owned by a company called Boldfield Limited Computing. It sells most of the original add-ons including RAM packs (£23 for 16k), joystick interfaces, keyboard adaptors, and so on. They also stock a motherboard which has an Ace expansion plug on one side and a ZX81 socket on the other; you could use this to connect your Sinclair RAM pack to the Jupiter Ace. It costs £13.80.

For further details you should contact Boldfield at Sussex House, Hobson Street, Cambridge CB1 1NJ.

Dragon key mystery

I have a strange problem with my Dragon 32 computer — sometimes it ignores keys when I'm typing quickly. For example, if I type LIST, the screen shows LST and I get a syntax error when I press ENTER. The problem occurs

with some words but not others.

Is there something mechanically wrong with the computer? Why does it work properly when I type slowly?
Graeme Newman, Crown East, Worcester

Your problem stems from some sloppy system programming — there's nothing wrong with the keyboard of your computer. The Basic interpreter in the Dragon, and in the Tandy Color Computer, contains a bug which affects the way multiple key presses are detected. The computer is meant to have 'roll-over', which means that you can press the next key of any sequence before you release the first. Of course, this is only useful for fast typists — when you type slowly you press the keys one by one.

Hold down the L key on your keyboard, then press E. The second letter appears even though L is still depressed. Now hold down key L and press I; this time the second key is ignored.

The Dragon keyboard is wired up in groups of eight keys. The computer reads each group of keys and then works out which key is pressed by examining the resultant pattern. It keeps a record of the last key pressed, so that it can determine which is the 'new key' as your fingers 'roll' from one to the next. The snag is that this is not properly done on the Dragon — it ignores the second key if two in the same group are depressed. I and S are in different groups, but L and I are in the same group.

There's no easy solution to the problem — you have a choice of typing more slowly or writing your own keyboard routine. The bug is not confined to program entry: INPUT AND INKEY\$ use the same code, and therefore also suffer from the bug. It has, however, been fixed on the Dragon 64.

END



The ZX Spectrum
Expansion System. Only £99.⁹⁵

Sinclair's complete alternative to floppy discs...



The ZX Spectrum Expansion System contains:

- One ZX Microdrive
- One ZX Interface 1
- One wallet containing four programs on Microdrive cartridge
- Microdrive demonstration cartridge
- One blank Microdrive cartridge
- Full documentation
- Connecting lead for Microdrive/Interface 1
- ZX Net Lead

The new ZX Spectrum +

Fully compatible with all Spectrum software and peripherals, including this Expansion System

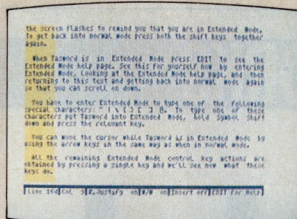
Tasword Two word processor

Turns your ZX Spectrum into a high-quality word processor!

Tasword Two has all the essential features of professional word processing packages – move and copy, insert, margin settings, 'help' pages, find and replace, and much more.

Written by Tasman Software Ltd.

Usual price (RRP): £13.90.



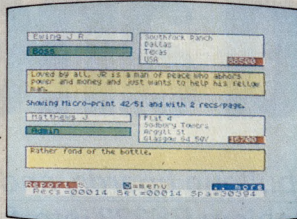
Masterfile filing system

Address lists... personal files... stock inventories... stamp or album collections... club records... recipes... if you can file it, you can Masterfile it!

Masterfile is a menu-driven filing and retrieval system of immense power. Display formats are user-defined, so the range of applications is enormous.

Written by Campbell Systems Ltd.

Usual price (RRP): £16.95.



Games Designer

Now, all you need to create original games are original ideas – and Games Designer! It has eight, very different, pre-programmed games for you to play as they are – or modify out of all recognition!

There's never before been an easier, more enjoyable, way into games design.

Written by Quicksilver Ltd.

Usual price (RRP): £14.95.



Ant Attack

The all-time classic 3D strategy game. Ant Attack combines stunning Escher-like graphics with fast-moving action and a real tactical challenge.

Your task is to enter the walled city, seek out your captured partner, and escape. At all times you can choose from four angles of view. But beware: the city is patrolled by giant ants...

Written by Quicksilver Ltd. Usual price (RRP): £6.95.



All programs run on a 48K Spectrum or Spectrum+. Recommended retail prices are for each program on cassette.

...includes this great set of Microdrive programs!



The unique ZX Microdrive system sets the Spectrum apart from all other home computers.

It gives you all the advantages of floppy disc drives – at a fraction of the cost. And tests show the Microdrives are faster than some disc drives.

Now, the complete Microdrive system comes in one package – together with four of the best-ever Spectrum programs, on Microdrive cartridges.

This software alone would normally cost you over £50.

Yet the Sinclair price for the complete ZX Spectrum Expansion Pack is just £99.95!

You'll find full details of its contents in the panel opposite.

ZX Microdrives – another Sinclair first!

The ZX Microdrive is a revolutionary fast access / mass storage device. And it's the only truly affordable alternative to disc drives...

- Loads or saves up to 85K of program or data from Microdrive cartridges.

- Just 3.5 seconds to access a typical file.

- Only 9 seconds to load a typical 48K program.

The ZX Microdrive cartridge – a unique storage medium.

Smaller than a matchbox, the ZX Microdrive cartridge packs in a massive amount of data and programs.

Each Microdrive cartridge holds at least 85K bytes of data or programs (that's 30 pages of A4 text). And you can store up to 50 different data files per cartridge, identified by titles of your choice.

Every cartridge comes in its own protective case. Simply remove the cartridge, slot it into the Microdrive, and it's ready to use.

ZX Interface 1 – adds powerful new capabilities to your Spectrum.

ZX Interface 1 connects to the back of your Spectrum and controls up to 8 Microdrives. (Additional Microdrives are available for £49.95 each.)

It also gives you:

- An RS 232 interface – to link your Spectrum with full-size printers, other

computers using RS 232 (the industry-standard interface) and provide data transmission over telephone lines, via modems.

- ZX Net – lets you set up a local area network of up to 64 Spectrums, for high-speed data communications between you and Spectrum-owning friends.

At your local Sinclair stockist – today!

The ZX Spectrum Expansion System adds an exciting new dimension to Spectrum and Spectrum+ computing. At £99.95 it's superb value too.

To find out more, call in at your local Sinclair stockist now!

Sinclair Research Ltd,
Camberley (0276) 685311.

© Sinclair, ZX, ZX Spectrum, ZX Microdrive, ZX Net and ZX Interface are Trade Marks of Sinclair Research Ltd.

sinclair

Full speed ahead!

Peter Tootill looks at high-speed bulletin boards, and reveals the common symptoms of problem RS232 interfaces.

Most bulletin boards that provide high-speed access in addition to the normal 300 bits/sec V.21 facility use the Prestel-type V.23 standard. This is fine as long as the BBS is talking to you, but when the roles are reversed, 75 bits/sec can become tedious; this is especially true if you want to upload software or a prepared message. The high-speed standard used in North America is Bell 212, which is equivalent to the CCITT's V.22 and runs at 1200 bits/sec in both directions (full duplex). But the problem with V.22 in the UK is that modems are still expensive (around £500) as miracle chip technology hasn't achieved this standard yet. This is a little surprising as Bell 212 is very popular in the US and Canada, and it's compatible with V.22 at 1200 bits/sec.

As an experiment, Liverpool Mailbox will be providing a V.22 service, in addition to the normal V.21 (300 bits/sec) service, which should be operating now. It will be interesting to see how many V.22 users there are out there, and if this results in any calls from people in the US using Bell 212.

The ICL OPD

The new ICL computer, the One Per Desk, is an interesting development. The concept of combining the busy executive's telephone-answering machine, micro, calculator and mainframe terminal in one unit looks like becoming the way of the future. It would also make a nice addition to any online computer user's equipment.

However, I can't believe that it will really take off as a terminal-to-mainframe system when it has to be used via a modem over a telephone line — and at a pedestrian 1200 bits/sec too. Most existing ICL users will be using terminals connected on high-speed hardwired links running at 9600 bits/sec. If they were to install a large number of OPDs, they would need racks of modems to answer the calls from the aforementioned busy executive wanting to access the mainframe system.

The hardware implications are daunting and security could also be a headache. Some organisations like to strictly control dial-up access to their computers, and this would be a prob-

lem if they had to consider a large number of OPD users.

However, if ICL produces a module that will enable the OPD to act as a hard-wired terminal as well as a stand-alone micro, then it will probably sell in large numbers to such customers.

Null modems

A 'null modem' is useful for connecting the RS232 ports of two computers. It takes care of things like swapping the connections to the transmit and receive data pins so that you don't have both computers talking on pin two and listening on pin three.

It also arranges the control lines in a way that fools the software into thinking that a modem is connected and has detected a carrier tone.

I have been using a null modem made by Peter Inglis, and it performs very well. It's very small, being hardly any bigger than two 25-way connectors. An added bonus is that it has two LEDs, one on each of the data lines, which flicker as the data passes; this can be a very useful feature when troubleshooting. The best news is the price — a remarkably low £9.50 plus 50p p&p. Mr Inglis can supply gender changers at the same price. Contact him at: 14 Arbour Lane, Chelmsford, Essex CM1 5RG. Tel: (0245) 267482.

RS232 troubleshooting

If you're having problems using online systems, there are a number of common symptoms which will give you a clue as to where to look for the cause and cure. Here are the most common cases:

Nothing seems to happen: check that your modem and the one you have called have locked together. Has your modem's carrier detect (CD) light come on? If not, then you are probably calling a system that has incompatible modem standards — Prestel with a 300 bits/sec modem, for example. Try a different system, or change the settings on your modem if it's a multi-standard type. Most systems operating in the UK are V.21 (300 bits/sec) or V.23 (1200/75 bits/sec). Most bulletin boards use V.21, Prestel uses V.23. Some systems provide both, either on separate numbers

or by automatically detecting your mode when you call.

If the CD light comes on but nothing appears on your screen, try sending a few carriage returns (for PSS send two carriage returns followed by the characters 'D1', and another return).

If you're still not getting anything on your screen, then it's possible that your computer is not sending (or receiving) data. If your modem has transmit and receive data (TD and RD) indicators, check that the TD one flickers when you type at the keyboard. Is the RD indicator flickering?

If you don't have TD and RD indicators, the easiest way to check that your computer is transmitting and receiving properly is to set your modem to test mode (sometimes called 'analogue loop') if it has this facility. If it doesn't, you can test the computer and RS232 interface by connecting the transmit and receive pins together (pins 2 and 3 on a standard 25-way connector).

In both these cases, with a terminal program running and set to full duplex, whatever you type on the keyboard should be echoed back to the screen. If not, it could be connection problems — are pins 2 and 3 the right way round? Alternatively, perhaps the lack of a control signal is stopping the computer from transmitting. Some software needs to see CD go high before it will start to send.

Try different software or investigate the state of the various pins with a voltmeter. A 6- or 9-volt battery can be used to set the various control lines high or low.

Garbled data: if you are receiving badly, or completely, garbled data when online, the most likely cause is incompatible word length and/or parity settings. The most common settings are 8-bit word, no parity, one or two stop bits, and 7-bit word, even parity, one or two stop bits. The number of stop bits is not as critical as the word length.

Another cause of garbled data is a poor phone line. In this case, you will often get letters appearing when nothing is actually being sent; this is caused by noise on the line.

Missing characters at the start of a line: this is most likely to be caused by your

system needing nulls after carriage returns. The solution, for BBSs at least, is to look for the command that enables you to change your terminal configuration. It is often called **FORMAT**.

Missing chunks of text: this is probably caused by flow control problems. When information is being sent to you from an online system, there may be times when your computer needs time to catch up. This is especially true at higher speeds, such as 1200 bits/sec. The usual way to pause output is to use

a couple of ASCII control characters called X-on and X-off (the 'X' stands for 'transmission'). If you lose chunks of data, it's probably because your system is overloaded with incoming data and is not sending an X-off character to request the sender to pause. Alternatively, it may be sending X-off and the sender doesn't recognise it, but this is unlikely as most online systems support X-on/X-off flow control. X-off is control-S (ASCII decimal 19), X-on is control-Q (ASCII decimal 17).

Everything sent to you appears on one line: this happens when your system needs a line feed after a carriage return and isn't getting one. Most BBSs have the facility to provide line feeds.

The system won't accept your password: if it won't, even though it has done so before, check that you are sending the correct case. Many systems see upper and lower case as different, and it's easy to get it wrong when the system doesn't echo it back to you.

END

UK free networks

Bulletin Board	Phone Number	Notes
BABBS-Bath	(0225) 23276	300/300 baud rate; 9pm-8am weekdays, 9am-noon weekends; Atari-based system
BABBS-Felixstowe	(0394) 276306	300/300 baud rate; 24 hours daily; Apple users' group
BABBS TWO-Basildon	(0268) 778956	300/300 baud rate; 24 hours daily; Apple users' group with special area for queries to Apple UK
Basug	(0742) 667983	300/300 baud rate; 24 hours daily
Bettisfield	(094875) 378	300/300 baud rate; 9pm-9am daily; remote CP/M system
Blandford Board	(0258) 54494	300/300 baud rate; 24 hours daily
CABB	(01) 631 3076	300/300 baud rate; 24 hours daily
CBBS SW	(0392) 53116	300/300 baud rate; 24 hours daily
CBBS Woking	(0626) 890014	1200/75 and 300/300 baud rates; 24 hours daily; jokes, jobs, reviews, news
CNOL Lancaster	(0524) 60399	300/300 baud rate; 24 hours daily; Clinical Notes Online service, mainly for medical users; works in conjunction with a database on the Datastar network
Computers Incorporated Newcastle	(0207) 543555	300/300 baud rate; 24 hours daily; primarily business-oriented
Forum 80 Hull	(0482) 859169	300/300 baud rate; 5-11.30pm weekdays, noon-11.30pm weekdays; Bell 103 standard, midnight-8am daily; international electronic mail, library for up/downloading
Forum 80 SPA	(0926) 39871	300/300 baud rate; 11pm-midnight daily; TRS-80 and Genie users' group
Forum 80 Wembley	(01) 902 2546	300/300 baud rate; 7-10pm weekdays, midday-10pm weekdays; electronic mail, library for downloading; ring and ask for Forum 80
Hamnet Hull	(0482) 497150	300/300 baud rate; 6pm-8am daily
Liverpool Mailbox	(051) 4288924	300/300 baud rate; 24 hours daily; electronic mail, program downloading, TRS-80 information; messages for PCW can be left on the board and will normally be read by us within 24 hours
Mailbox-80 Stourport	(0384) 635336	300/300 baud rate; 6pm-8am daily
Manchester Open Bulletin Board	(061) 7368449	300/300 baud rate; 24 hours daily
MBBS-Mitcham	(01) 640 2617	300/300 baud rate; 10am-8pm Thursday and Sunday; BBC-based system with jokes, graffiti, electronic mail, and Atari and BBC sections
MG-Net CBBS London	(01) 399 2136	300/300 baud rate; 5-10pm Sunday; electronic mail, program downloading
Microweb Manchester	(061) 4564157	300/300 baud rate; 24 hours daily; <i>Micro User</i> magazine, mainly for BBC users
NBBBS-North Birmingham	(0827) 288810	300/300 baud rate; 24 hours daily
OBBS Manchester	(061) 4271596	300/300 baud rate; weekdays except 7pm-9pm, weekends except 10am-10pm
PIP-Sheffield	(0742) 667983	300/300 baud rate; 24 hours daily
Southern BBS	(0243) 511077	300/300 baud rate; 8pm-2am daily; ring-back system (dial the number, let phone ring once, and then ring back); messages, downloading
Stoke ITEC	(0782) 265078	300/300 baud rate; 24 hours daily; remote CP/M system
TBBS London	(01) 348 9400	300/300 baud rate; 9am-7am daily
TBBS London Metro	(01) 341 7840	300/300 and 1200/75 baud rate (including Prestel compatibility); 24 hours daily; temporary number for the TBBS Nottingham system
WABBS-Worthing	(0903) 42013	300/300 baud rate; 24 hours daily; ring-back system (dial the number, let phone ring once, and then ring back); Atari-based

SUBSET

David Barrow presents more documented machine code routines and useful information for the assembly language programmer. If you have a good routine, an improvement or conversion of one already printed, or just a helpful programming hint, then send it in and share it with other programmers. Subroutines for any of the popular processors and computers are welcome but please include full documentation. All published code will be paid for. Send your contributions to Sub Set, PCW, 62 Oxford Street, London W1A 2HG.

Z80 floating point

As a somewhat delayed follow-up to his conversion of a 32-bit integer arithmetic suite from Z80 to 6502 code (February 1982, *PCW*), Dennis May of London provides Subset with a Z80 suite to perform floating point binary arithmetic.

The suite acts on arguments anywhere in memory, indexed by the Z80's two 16-bit index registers, IX and IY. It returns the result in the six registers BCDEHL, ready for storage anywhere. The zero and carry flags are used to convey division by zero and overflow error information.

Each number in the format required by the suite is contained in six bytes. The first byte is the exponent and the second is the sign byte of which only bit 7 is actually used. The remaining four bytes form the mantissa, or fraction. The 32-bit precision is about the equivalent of 9.5 decimal digits. The range of magnitude made available by the format is 1×2^{-128} (about

$0.29E-38$) to $4,294,967,295 \times 2^{95}$ (about $0.17E39$).

To facilitate the possible use of 16-bit arithmetic, the mantissa is stored with the low-order byte in the third byte of the number, high order in the sixth byte. The mantissa is normalised so that for a non-zero number, bit 31 is always set. (Anyone wishing to try and improve upon the suite might like to utilise this fact — the sign bit can be stored in the high order bit of the mantissa, cutting variable storage by 1/6.)

The exponent is held as an 'excess 128' value; this is similar to the 'two's complement' notation with which you should be familiar but has 128 (80H) as the zero exponent value with lower values negative and higher ones positive. The advantage of excess 128 over the familiar method of indicating signed numbers is that zero — the easiest value to test — signifies either overflow or underflow. Dennis also uses a zero exponent to indicate that a number is zero, making it unnecessary to clear the mantissa and reset the sign.

33-bit subtraction

One elegant feature of the suite worth commenting upon is the implementation of 33-bit arithmetic in the division routine FPDIV. If, in any iteration, the 32-bit subtraction of divisor from dividend fails then a borrow is

generated. However, the previous iteration shifts the highest dividend bit out to carry and the subtraction would be possible if this bit were set. In fact the borrow in 33-bit arithmetic will be the inverse of the shifted out bit, and the algorithm used by Dennis simply replaces the 32-bit borrow by the complement of the shifted bit.

DATASHEET 1

```
=====
: = FETCH      Fetch arguments to stack.
: MOPUP        (MOPDZ, MOPNR, MOPDV, MOPUF) Exit correctly.
=====
: JOB          FETCH: To copy two arguments to stack work area and
:              clear result flags.
:              MOPUP: To set correct flags, zeroise result if
:              necessary, pull results and exit.
: ACTION       See comments.
=====
```

```
=====
: CPU          Z80
: HARDWARE     FETCH: arguments in RAM. MOPUP: none.
: SOFTWARE     FETCH: none. MOPUP: "NORM" and "ROUND".
=====
: INPUT        FETCH: IX and IY address the two arguments
:              MOPUP: Result in 4 bytes on stack addressed by IX.
: OUTPUT       FETCH: IX, IY, AF on stack. Arguments on stack
:              indexed by IX. All flags cleared.
:              A, B, DE and HL changed.
:              MOPUP: Result in BCDEHL. IX, IY and A restored.
:              Z = 1: division by zero (FPDIV).
:              Z = 0: C = 1: overflow. C = 0: no error.
: ERRORS       None.
: REG USE      F BC DE HL IX IY (A changed in FETCH).
: STACK USE    16 (MOPUP: -16).
: RAM USE      None.
: LENGTH       FETCH: 48. MOPUP: 39.
: CYCLES       Not given.
=====
: CLASS 2      -discreet      *interruptable      *promable
: *****     *reentrant      *relocatable        *robust
=====
:
: FETCH POP HL      :Get return address in HL.          E1
: PUSH IX           :Save IX, IY and AF on stack        DD E5
: PUSH IY           :before stacked numbers, other     FD E5
: PUSH AF           :registers used for output.         F5
: LD IX,-12         :Index stack area below            DD 21 F4 FF
: ADD IX,SP         :12-byte workspace and set         DD 39
: LD SP,IX          :Stack pointer accordingly.         DD F9
: LD D,(IX+17)      :Get stacked IX to DE for           DD 56 11
: LD E,(IX+16)      :transfer loop source.              DD 5E 10
: LD B,6            :Count for 6-byte numbers.          06 06
:
: FETCHL LD A,(DE)   :Move byte from 1st number to      1A
: LD (IX+0),A        :workspace low address.            DD 77 00
: LD A,(IY+0)        :Move byte from 2nd number to      FD 7E 00
: LD (IX+6),A        :workspace high address.           DD 77 06
: INC IX            :Bump workspace pointer             DD 23
: INC DE            :and 1st number pointer             13
: INC IY            :and 2nd number pointer             FD 23
: DJNZ FETCHL       :Repeat for 6-byte numbers.         DD EF
:
: LD DE,-6          :Reset IX to point to start         11 FA FF
: ADD IX,DE          :of stack workspace area.          DD 19
: LD (IX+12),B       :Clear Z and Cy flags (B=0).        DD 70 0C
: JP (HL)           :Return by jumping.                  E9
=====
:
: MOPUP            :Exit routine with entry points for
:                  :division by zero, overflow, underflow or
:                  :zero result, normalise and round.
:
: MOPDZ SET 6,(IX+12) :Set stacked Z flag to show       DD CB 0C F6
: JR MOPPOP        :division by zero, and exit.         18 10
: MOPNR CALL NORM   :Normalise if necessary,            CD 10 hi
: CALL ROUND       :then round, and go exit if         CD 10 hi
: JR NZ,MOPPOP     :result exponent not zero.          20 00
: MOPDV SET 0,(IX+12) :Set stacked Cy: overflow         DD CB 0C C6
: MOPUF LD (IX+0),0 :Set exponent 0, zero result.       DD 36 00 00
:
: MOPPOP LD SP,IX   :Set SP at result, losing any       DD F9
: POP BC           :values on stack, and pick up        C1
: POP HL           :result in BCDEHL, B = sign,         E1
: POP DE           :C = exp, DEHL = mantissa.           D1
: POP IX           :Pop 6 bytes of 2nd argument         DD E1
: POP IX           :into IX to discard it and           DD E1
: POP IX           :move Stack Pointer up to            DD E1
: POP AF           :saved registers. Restore A          F1
: POP IY           :and result flags. Restore           FD E1
: POP IX           :argument pointers IX and IY.        DD E1
: RET              :Exit floating point suite.          C9
=====
```

DATASHEET 2

```
=====
: = NORM        Normalise floating point number.
: > SWAP        Swap two contiguous floating point numbers.
: > ROUND       Round floating point number.
: > RSHIFT      Shift floating point number justification.
=====
: JOB          Set of four utility subroutines acting on floating
:              point mantissa and exponent.
: ACTION       See individual routine comments.
=====
```



```

:CPU      Z80
:Hardware  RAM indexed by IX (Stack workspace within suite).
:Software  None.

```

```

:INPUT     IX addresses floating point number.
           C = rounding byte. D = byte above mantissa.
           B = bit count for RSHIFT.

```

```

:OUTPUT     Number normalised, rounded or right shifted (or
           exchanged with succeeding number in SWAP).
           C, D and exponents are corrected. B & A changed.
           Z set to show exponent overflow in ROUND & RSHIFT.

```

```

:Errors     None.
:REG USE    NORM: AF C IX.  SWAP: F B DE IX.
           ROUND: AF C IX.  RSHIFT: AF B C D IX.
:STACK USE  SWAP: 2. Others: none.
:RAM USE     None.
:LENGTH     NORM: 33. SWAP: 24. ROUND: 36. RSHIFT: 39.
:CYCLES      Not given.

```

```

:CLASS 2    -discreet      *interruptable  *promable
:*****     *reentrant     *relocatable   *robust

```

```

:
NORM LD A,(IX+5) :Test high order bit of DD 7E 05
      RLA :mantissa and exit if set 17
      RET C :with number normalised. D8
      LD A,(IX+0) :Test input or adjusted DD 7E 00
      OR A :exponent and exit if zero as B7
      RET Z :either zero or underflow. C8
      SBC A :Else shift mantissa CB 21
      RL (IX+2) :left one bit with bit from DD CB 02 16
      RL (IX+3) :rounding byte going in to DD CB 03 16
      RL (IX+4) :mantissa lowest bit. DD CB 04 16
      RL (IX+5) :Then subtract 1 from exponent DD CB 05 16
      DEC (IX+0) :to show shift made and loop DD 35 00
      JR NORM :until normalised or zero. 18 DF

```

```

:
SWAP LD B,6 :Count for 6-byte numbers. 06 06
SWAP LD E,(IX+0) :Starting with lowest DD 5E 00
      LD D,(IX+6) :addressed bytes, exchange DD 56 06
      LD (IX+0),D :corresponding bytes in 1st DD 72 00
      LD (IX+6),E :and 2nd arguments, index DD 73 06
      INC IX :next bytes higher and repeat DD 23
      DJNZ SWAP :for all six bytes. 10 F0
      LD DE,-6 :Restore IX to point to DD FA FF
      ADD IX,DE :lowest workspace byte. DD 19
      RET :Exit, numbers swapped. C9

```

```

:
ROUND LD A,(IX+0) :Test exponent and DD 7E 00
      OR A :if not zero then okay B7
      JR NZ,ROUND :but if zero then 20 02
      LD C,0 :zeroise rounding byte C. 0E 00
      ROUND LD A,80H :Get complement of rounding 3E 00
      XOR C :bit so exit made with Z = 0 A9
      RET M :if now set (no rounding). F8

```

```

:
      INC (IX+2) :Else round up mantissa, DD 34 02
      RET NZ :incrementing each byte in CB
      INC (IX+3) :turn if last byte overflowed DD 34 03
      RET NZ :else exit Z reset if C0
      INC (IX+4) :at any stage the increment DD 34 04
      RET NZ :does not produce zero (i.e. C0
      INC (IX+5) :no carry to next byte). DD 34 05
      RET NZ :If 4th byte incremented to C0
      SET 7,(IX+5) :zero then normalise, set top DD CB 05 FE
      INC (IX+0) :bit and increment exponent. DD 34 00
      RET :Exit Z set if exp. overflow. C9

```

```

:
RSHIFT LD A,B :Test input shift count 78
      OR A :and exit immediately if zero B7
      JR Z,RSHEND :but with Z reset. 28 21
      LD A,(IX+0) :Test exponent and exit DD 7E 00
      OR A :immediately if zero but B7
      JR Z,RSHEND :with Z reset. 28 1B

```

```

:
RSHLP SRL D :Else shift mantissa right CB 3A
      RR (IX+5) :by one bit, bit from D DD CB 05 1E
      RR (IX+4) :going to high order bit DD CB 04 1E
      RR (IX+3) :of mantissa and low order DD CB 03 1E
      RR (IX+2) :bit of mantissa shifted DD CB 02 1E
      RR C :out to rounding byte C. CB 19
      INC (IX+0) :Adjust exponent for shift, DD 34 00
      RET Z :exit Z = 1 on overflow, C8
      DJNZ RSHLP :else repeat for count. 10 E6
      LD A,B :Ensure Z reset on exit. 78

```

```

:
RSHEND INC A :Make A non-zero so Z reset 3C
      RET :to show non-overflow on exit. C9

```

DATASHEET 3

```

:=====
:ADD      Add mantissas of two floating point numbers.
:SUBM     Subtract mantissas of two floating point numbers.
:NEGM     Negate mantissa of a floating point number.

```

```

:JOB       Set of three arithmetic utility routines acting on
           the 4-byte mantissas of floating point numbers.
:ACTION     See individual routine comments.

```

```

:CPU      Z80
:Hardware  RAM indexed by IX (Stack workspace within suite).
:Software  None.

```

```

:INPUT     IX addresses floating point number(s).
           (C = rounding byte in NEGM).
:OUTPUT     IX unchanged. Cy = carry or borrow out.
           ADDM: Sum stored in 1st number mantissa.
           SUBM: Difference stored in 1st number mantissa.
           B = 0 if difference = 0.

```

```

:
:NEGM      2's complement negation stored in 1st number
           mantissa and rounding byte C.
           Cy = 0 if negation = 0, else Cy = 1.

```

```

:Errors     None.
:REG USE    AF B IX (also C in NEGM).
:STACK USE  4
:RAM USE     None.
:LENGTH     ADDM: 26. SUBM: 32. NEGM: 27.
:CYCLES      Not given.

```

```

:CLASS 2    -discreet      *interruptable  *promable
:*****     *reentrant     *relocatable   *robust

```

```

:
ADDM PUSH DE :Save DE for use in ADDM. D5
      LD B,4 :Set 4-byte mantissa count. 06 04
      OR A :Clear Cy initially. B7

```

```

:
ADDMLP LD A,(IX+2) :Loop adding corresponding DD 7E 02
      ADC A,(IX+8) :bytes of mantissa, storing DD 8E 08
      LD (IX+2),A :result in number at IX+0. DD 77 02
      INC IX :Repeat for all four bytes DD 23
      DJNZ ADDMLP :of mantissa. 10 F3

```

```

:
      PUSH AF :Save flags while F5
      LD DE,-4 :restoring IX to point to 11 FC FF
      ADD IX,DE :1st byte of 1st number. DD 19
      POP AF :Restore flags, F1
      POP DE :and DE then exit with D1
      RET :mantissa added. C9

```

```

:
SUBM PUSH DE :Save DE for use in SUBM. D5
      LD B,4 :Set 4-byte mantissa count. 06 04
      XOR A :Clear borrow initially and AF
      LD D,A :clear zero indicator D. 57

```

```

:
SUBMLP LD A,(IX+2) :Subtract corresponding bytes DD 7E 02
      SBC A,(IX+8) :of 2nd number mantissa from DD 9E 08
      LD (IX+2),A :1st with result to 1st. DD 77 02
      PUSH AF :Save borrow and F5
      OR D :merge any set bits into B2
      LD D,A :zero indicator. 57
      POP AF :Restore borrow, then index F1
      INC IX :next bytes and repeat for DD 23
      DJNZ SUBMLP :all four bytes of mantissa. 10 EF

```

```

:
      PUSH AF :Save flags and transfer zero F5
      LD B,D :indicator to B. Then 42
      LD DE,-4 :restore IX to point to 11 FC FF
      ADD IX,DE :1st byte of 1st number. DD 19
      POP AF :Restore flags, F1
      POP DE :and DE then exit with D1
      RET :mantissa subtracted. C9

```

```

:
NEGM PUSH DE :Save DE for use in NEGM. D5
      LD B,4 :Set 4-byte mantissa count. 06 04
      XOR A :Clear Accumulator and Cy. AF
      SUB C :Negate rounding byte in C 91
      LD C,A :with possible carry to loop. 4F

```

```

:
NEGMLP LD A,0 :Loop subtracting each byte 3E 00
      SBC A,(IX+2) :of mantissa and carry from DD 9E 02
      LD (IX+2),A :previous byte from zero, DD 77 02
      INC IX :2's complement result back DD 23
      DJNZ NEGMLP :to number at IX+0. 10 F4

```

```

:
      PUSH AF :Save flags while F5
      LD DE,-4 :restoring IX to point to 11 FC FF
      ADD IX,DE :1st byte of 1st number. DD 19
      POP AF :Restore flags, F1
      POP DE :and DE then exit with D1
      RET :mantissa negated. C9

```

DATASHEET 4

```

:=====
:FPSUB     Floating point subtraction.
:FPADD     Floating point addition.

```

```

:JOB       To perform addition or subtraction on two floating
           point numbers held in memory, returning a valid
           result in registers or error information in flags.
:ACTION     Move numbers to stack workspace.
           IF either number = 0 THEN: [ Return other number. ]
           Equalise exponents, justifying mantissas.
           Add/subtract mantissas with any necessary negation,
           justification, sign change or exponent zeroising.
           Exit, result to registers, setting correct flags.

```

```

:CPU      Z80
:Hardware  Memory containing the two numbers.
:Software  FETCH MOPUP SWAP RSHIFT ADDM SUBM NEGM

```

```

:INPUT     IX addresses 1st number, IY 2nd number in memory.
:OUTPUT     IX, IY and indexed numbers unchanged. Z = 0.
           Cy = 0: Result in BCDEHL. Cy = 1: Overflow.

```

```

:Errors     None.
:REG USE    F BC DE HL IX IY
:STACK USE  22
:RAM USE     None.
:LENGTH     93
:CYCLES      Not given.

```

```

:CLASS 2    -discreet      *interruptable  *promable
:*****     *reentrant     *relocatable   *robust

```

```

:
FPADD CALL FETCH :Move arguments to workspace CD 10 hi
      JR FPAS :on stack. Go to common part. 18 0B

```


SUBSET

```

FPMUL CALL FETCH :Get arguments to workspace CD 10 hi
LD A,-1 :and negate sign of second 3E FF
XOR (IX+7) :number so add/sub operation DD AE 07
LD (IX+7),A :is essentially the same. DD 77 07

:
FPAS LD A,(IX+0) :Get and test 1st exponent DD 7E 00
OR A :for number = 0. If so, move B7
CALL Z,SWAP :2nd number to result place. CC 10 hi
LD A,(IX+6) :Get and test 2nd exponent. DD 7E 06
OR A :if zero, return 1st number B7
JP Z,MOPPOP :as sum or difference. CA 10 hi

:
SUB (IX+0) :Subtract exponents to give DD 96 00
JR NC,FPASEQ :shifts needed to equalise 38 05
NEG :exponents, swapping numbers ED 44
CALL SWAP :if necessary. CD 10 hi
LD C,0 :Clear rounding byte and OE 00
LD D,C :shift-in byte. 51
LD B,A :Move shift count to B and 47
CALL RSHIFT :shift if needed. CD 10 hi

:
LD A,(IX+1) :Compare signs. If same then DD 7E 01
XOR (IX+7) :addition of mantissas is DD AE 07
RLA :needed but subtraction if 17
JR C,FPMSUB :signs are different. 38 10

:
CALL ADDM :Add mantissas. Prepare for CD 10 hi
LD B,1 :shifting carry out of add 06 01
LD D,1 :back into mantissa. 16 01
CALL C,RSHIFT :Shift any carry back in. DC 10 hi
JP Z,MOPDV :Exit if exponent overflow. CA 10 hi
JP MOPNR :Normalise, round & exit. C3 10 hi

:
FPMUL CALL SUBM :Subtract mantissas and, CD 10 hi
PUSH AF :saving borrow, test F5
LD A,B :if difference is zero, 78
OR A :if so then exit clearing B7
JP Z,MOPUF :exponent to show number = 0. CA 10 hi
POP AF :restore borrow and negate F1
CALL C,NEGM :result if borrow generated. DC 10 hi
RRA :Use borrow to set correct 1F
XOR (IX+1) :result sign, negating sign DD AE 01
LD (IX+1),A :only if Cy was set. DD 77 01
JP MOPNR :Normalise, round & exit. C3 10 hi

```

DATASHEET 5

```

=====
:= FPMUL Floating point multiplication.
=====
:JOB To perform multiplication on two floating point
: numbers held in memory, returning a valid product in
: registers or error information in flags.
:ACTION Move numbers to stack workspace.
: IF either number = 0 THEN: [ Return zero.]
: Add exponents, exiting on overflow or underflow.
: Product sign = multiplier XOR multiplicand signs.
: Multiply mantissas.
: Normalise, round and exit, product to registers.
:
:CPU Z80
:HARDWARE Memory containing the two numbers.
:SOFTWARE FETCH MOPUP ADDM

:INPUT IX addresses multiplier, IY multiplicand in memory.
:OUTPUT IX, IY and indexed numbers unchanged. Z = 0.
: Cy = 0: Result in BCDEHL. Cy = 1: Overflow.
:ERRORS None.
:REG USE F BC DE HL IX IY
:STACK USE 24
:RAM USE None.
:LENGTH 110
:CYCLES Not given.

:CLASS 2 -discreet *interruptable *promable
:***** *reentrant *relocatable *robust
=====

:
FPMUL CALL FETCH :Move numbers to workspace on CD 10 hi
LD A,(IX+0) :stack and test exponent of DD 7E 00
OR A :multiplier, returning it as B7
JP Z,MOPPOP :product if zero. CA 10 hi
LD A,(IX+6) :Test multiplicand exponent DD 7E 06
OR A :and exit with zero product B7
JP Z,MOPUF :if it is zero. CA 10 hi

:
ADD A,(IX+0) :Else add exponents, use Cy DD 86 00
JR C,FPMPDS :and S to determine if add 38 05
JP P,MOPUF :gives underflow or overflow F2 10 hi
JR FPMEXS :and if so, exit with correct 18 03
FPMPOS JP M,MOPDV :zero result/overflow flag. FA 10 hi
FPMEXS ADD A,B0H :Restore excess 128 exponent C6 00
LD (IX+0),A :to product exponent byte. DD 77 00

:
LD A,(IX+1) :Exclusive-OR multiplier DD 7E 01
XOR (IX+7) :and multiplicand signs to DD AE 07
LD (IX+1),A :give product sign. DD 77 01

LD L,(IX+2) :Move multiplier mantissa DD 6E 02
LD H,(IX+3) :low-word to (SP) DD 66 03
PUSH HL :and high-word to HL E5
LD L,(IX+4) :for shifting in DD 6E 04
LD H,(IX+5) :multiplication loop. DD 66 05

:
LD C,0 :Zeroise rounding byte 0E 00
LD (IX+2),C :and product accumulator DD 71 02
LD (IX+3),C :replacing multiplier DD 71 03
LD (IX+4),C :in workspace. DD 71 04
LD (IX+5),C : DD 71 05

```

```

LD D,32 :Set 32 bit count. 16 20

:
FPMUL SRL H :Long multiplication by shift CB 3C
RR L :and addition at correct bit CB 1D
EX (SP),HL :place if multiplier bit set. E3
RR H :Shift right next multiplier CB 1C
RR L :bit through HL and (SP) CB 1D
EX (SP),HL :into Cy. E3
CALL C,ADDM :If set, add multiplicand DC 10 hi
RR (IX+5) :and shift partial product DD CB 05 1E
RR (IX+4) :right to next bit place, DD CB 04 1E
RR (IX+3) :getting any carry from DD CB 03 1E
RR (IX+2) :addition. Rounding byte DD CB 02 1E
RR C :takes shift out bits. CB 19
DEC D :Repeat for all 32 bits of 15
JR NZ,FPMUL :multiplier. DD 0E
JP MOPNR :Normalise, round & exit. C3 10 hi

```

DATASHEET 6

```

=====
:= FPDIV Floating point division.
=====
:JOB To perform division on two floating point numbers
: held in memory, returning a valid quotient in
: registers or error information in flags.
:ACTION Move numbers to stack workspace.
: IF divisor = 0 THEN: [ Exit, division by zero.]
: IF dividend = 0 THEN: [ Return zero.]
: Subtract exponents, exit on overflow or underflow.
: Quotient sign = dividend XOR divisor signs.
: Divide mantissas.
: Normalise, round and exit, quotient to registers.
:
:CPU Z80
:HARDWARE Memory containing the two numbers.
:SOFTWARE FETCH MOPUP SUBM ADDM

:INPUT IX addresses dividend, IY divisor in memory.
:OUTPUT IX, IY and indexed numbers unchanged.
: Z = 1: division by zero.
: Z = 0: Cy = 0: Result in BCDEHL. Cy = 1: Overflow.
:ERRORS None.
:REG USE F BC DE HL IX IY
:STACK USE 24
:RAM USE None.
:LENGTH 114
:CYCLES Not given.

:CLASS 2 -discreet *interruptable *promable
:***** *reentrant *relocatable *robust
=====

:
FPDIV CALL FETCH :Move numbers to workspace on CD 10 hi
LD A,(IX+6) :stack and test exponent of DD 7E 06
OR A :divisor. If zero then error B7
JP Z,MOPDZ :exit - division by zero. CA 10 hi
LD A,(IX+0) :Test dividend exponent, if DD 7E 00
OR A :zero then return valid B7
JP Z,MOPUF :zero quotient. CA 10 hi

:
SUB (IX+6) :Subtract exponents, use Cy DD 96 06
JR NC,FPDPOS :and S to test if subtraction 38 05
JP P,MOPUF :gives underflow/overflow, F2 10 hi
JR FPDPOS :if so exit with correct 18 03
FPDPOS JP M,MOPDV :zero quotient/overflow flag. FA 10 hi
FPDPOS ADD A,B1H :Correct excess 128 exponent C6 01
JP Z,MOPDV :+1 for bit normalisation, CA 10 hi
LD (IX+0),A :exiting if overflow. DD 77 00

:
LD A,(IX+1) :Exclusive-OR dividend and DD 7E 01
XOR (IX+7) :divisor sign to give quotient DD AE 07
LD (IX+1),A :sign, replacing dividend. DD 77 01
LD HL,0 :Clear quotient mantissa in 21 00 00
PUSH HL :and HL, clear rounding E5
LD C,H :byte C. Set D as 32-bit count 4C
LD D,34 :+ 1 normalisation + 1 round. 16 22

:
FPDLP RL E :Save hi-bit shifted out of CB 13
CALL SUBM :dividend and subtract divisor CD 10 hi
JR NC,FPDAD :skip if subtraction went ok 38 03
RR E :else correct for 33-bit CB 18
CCF :subtraction. If still no go 3F
FPDAD CALL C,ADDM :then add divisor back and DC 10 hi
JR C,FPDRS :skip quotient bit setting. 38 02
SET 5,C :Set correct place bit. CB E9

:
FPDRS SLA C :Shift partial quotient and CB 21
ADC HL,HL :rounding byte in E3 6A
EX (SP),HL : (SP), HL and C one bit left ED 01
ADC HL,HL :to next bit place. ED 6A
EX (SP),HL : E3
SLA (IX+2) :Shift dividend left DD CB 02 26
RL (IX+3) :by one bit to next bit place DD CB 03 16

RL (IX+4) :stop bit out to Cy. DD CB 04 16
RL (IX+5) :Repeat for 34 bits DD CB 05 16
DEC D :needed to ensure correct 15
JR NZ,FPDLP :normalised, rounded quotient. 20 D4

:
LD (IX+2),L :Move quotient mantissa DD 75 02
LD (IX+3),H :from (SP) and HL to DD 74 03
POP HL :replace dividend in stack E1
LD (IX+4),L :workspace as raw quotient DD 75 04
LD (IX+5),H :then exit to normalise DD 74 05
JP MOPNR :and round. C3 10 hi

```


Tandy® The Model 4P - Power & Portability At A Truly Unbeatable Price!



A Completely Portable Version Of Our Model 4 Computer!

£999

Exclusive of VAT



Take Model 4P With You - It Weighs Only 26 Pounds!

Our versatile Model 4 is a truly portable unit, and will run all Model 4 disk software and also Model III TRSDOS and LDOS disk programs (in Model III mode) without change - so a huge library is already available. Model 4P is compatible with the CP/M Plus* operating system which opens the door to literally thousands of applications! The TRSDOS 6 operating system lets you use extra memory as a superfast disk drive.

Unlike some transportables, it's big on features, such as a full 80-character by 24-line 9" green display that can be upgraded to provide optional 640 x 240 high resolution graphics. Its full-size keyboard features CONTROL, CAPS and three function keys. A 64K memory as standard and a 128K option means it is ideal for larger tasks.

The Model 4P is ready to go to work in any small business - you can prepare accurate balance sheets and income statements for a fast analysis of your company's profits, improve your cash flow by monitoring your receivables to speed up collections and identify bad debts, and optimize your payment schedule for maximum efficiency.

Thoroughly documented, the Model 4P comes with Microsoft** Disk BASIC and TRSDOS 6 operating system, owner and programming manuals, reference card, and an introduction to your computer that gets you started immediately. Housed in a hi-impact ABS case with built-in carry handle.

Model 4P. 26-1080 £999.00
Model 4 Desktop Version. 1 Disk Drive. 26-1068 £849.00
Model 4 Desktop Version. 2 Disk Drive. 26-1069 £999.00

All Prices Are Exclusive of VAT

*CP/M Plus TM of Digital Research **Microsoft TM of Microsoft Corp.

Specifications:

Microprocessor: 4 MHz Z-80® A (2 MHz in Model III mode). **Memory:** 64K RAM, expandable to 128K. Provides for disk drive emulation in RAM, only 64K addressable from BASIC. **Keyboard:** 70-key typewriter-style with datapad, plus CONTROL, CAPS and 3 programmable function keys (F1, F2, F3). **Video Display:** 80 x 24 (Model 4 mode), 64 x 16 (Model III mode), or double-width 40 or 32 characters per line. Upper and lower case. Reverse video (Model 4 mode), 96 text, 64 graphics and 96 "special" characters. **Language:** Microsoft 5.0 BASIC. **Sound:** Obtainable from BASIC. Toggled "keyclick". **Disk Drives:** Two built-in double-density 184K 5¼" drives. **External Connections:** Parallel printer port, RS-232C serial port. **Dimensions:** 16½ x 13¼ x 9¾". **Power:** 240 VAC, 50 Hz.

Tandy® Tandy®

COMPUTER CENTRE

Available at all Tandy Computer Centres and at Tandy stores and participating dealers

Take A Look At Tandy Today

Visit your local store or dealer and ask about our expanding range of microcomputers and software - we service what we sell!

See Yellow Pages For Address Of Store Nearest You

Send For Further Information to:

Computer Marketing, Tandy Corporation (Branch UK), Tameway Tower, Bridge Street, Walsall, West Midlands. WS1 1LA.

Name

Address

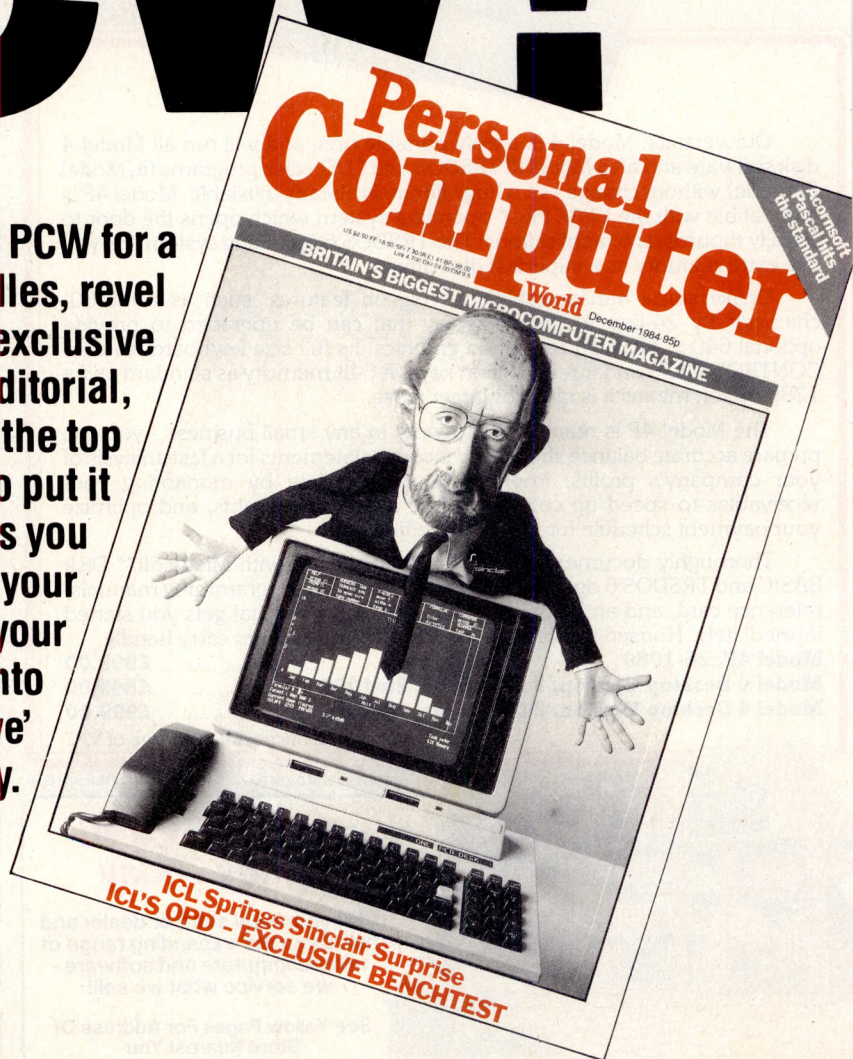
Post Code Tel. No. PCW13



TEST DRIVE PCW!

**MONEY BACK
GUARANTEE**

Subscribe today, and take PCW for a 'Test Drive'. See how it handles, revel in the sleek design, the exclusive benchtests, the blinding editorial, the hot tips, the humour, the top writers—You won't be able to put it down!! If after three months you don't wish to continue your subscription we will refund your payment in full. So, get into gear and 'Test Drive' PCW today.



TRANSACTION FILE

Your chance to buy, sell or swap equipment.

- **APPLE System ITT 2020**, 48k, disk drive, dos 3.3, UCSD Pascal, +16k RAM card, printer interface, DOS toolkit, assembler, Applewriter I, other software, £395. Tel: Coventry (0203) 418576.
- **COMMODORE CBM 3022** 80-col tractor feed printer with Pet graphics, £150. Tel: (0908) 583278.
- **CBM 4032/8032, 4032 9"** integral screen upgraded to 8032, switchable to 4032, runs all 80 column 8000 series software; included: manuals, Basicalc, Papermate + Database, £350 ono. Tel: Ringwood 79593, Mr Brown.
- **BBC Model B**. With 40/80 track switchable, single sided disk drive. Double density interface, plus software, books and disks, £650 ono. Tel: 01-764 4453 after 6pm.
- **WANTED: Osborne I** software. Also suitable modem and broken or damaged Osborne I. Tel: Brian on 0253-25679.
- **OSBORNE I**. Excellent condition, WordStar, Mailmerge, Supercalc, MBasic, CBasic, CP/M manual, TV adaptor and spare disks. Great value at £600 ono. Tel: 02774-56950.
- **SHARP MZ80A**. With printer interface, lots of software incl, many Basics, Pascal, Forth, Zen. User notes, books and listings. Bargain at £345. Tel: 021-704 9201.
- **COMPLETE set Personal Computer World**. Vol 1 No 1 April 78 to Vol 4 April 81. Offers. Buyer collects. Holmes 16 Ridgeway, Acomb, York YO2 5BZ. Tel: 0904 791472.
- **SHARP MZ80k, 48k**, integral display and cassette Sharp Basic and machine language books and tapes. Tel: 0276 33970 Camberley. Price £150.
- **PSION organiser**. Hardly used. With maths pack manuals £70. No offers, Trutwein, Bracknell 483244 ext 120 Mon to Fri 10am to 2.30pm.
- **OHIO scientific CD-2P**. 48k twin 8in disks, separate keyboard and monitor. 30 disks, WP, spreadsheet and database, and games. Move forces sale. Offers over £300. Tel: 01-493 1098 daytime, 01-586 4249 eves. Contact S. Birchall.
- **COMMODORE CBM 3022** 80 col tractor feed printer with PET graphics, £150. Tel: (0908) 583278.
- **APPLE system ITT 2020**, 48k, disk drive DOS 3.3, UCSD Pascal +16k RAM card, printer interface. DOS toolkit, assembler, Applewriter I, other software, £395. Tel: Coventry (0203) 418576.
- **CBM4032/8032 4032 9"** integral screen upgraded to 8032 switchable to 4032, runs all 80 column 8000 series software included, manuals, Basicalc, Papermate plus Database, £350 ono. Tel: Ringwood 79593 Mr Brown.
- **NEWBRAIN Model a**, £60, including technical manual, beginners guide, Forth, disassembler, books, odds and ends. HOW Caple 600 (Herefordshire).
- **COMMODORE 8096**. 8050 disks, silicon office, JCL business ROM, Calco Master, Whitby chip, Simpay file, other sundries. Will split. Open to sensible offers. Tel: 0926 38381 eve.
- **IBM PC2, 640k RAM**, colour monitor, 8087, APL language, twin 360k diskettes, Basic compiler and other extras, 40% discount, may split, John Perry. Tel: Hayling Island (0705) 468778 morning/evenings.
- **APPLE II +**, 64k, Disk drive, Z80 softcard, parallel interface and colour cards, Paper Tiger IDS440 printer. Excellent condition. Will separate. Byte magazine 1980-1981. Carrying case and documentation, £800. Tel: 031-339 7900.
- **APPLE IIe**; with Apple disk drive and Apple silent type printer. 12in Philips monitor, also has TV output, £695. Tel: Worthing 213174 (daytime).
- **EPSON HX20** micro, cassette, carrying case, manuals, mains charger, manuals 'Easy Basic' and 'Getting Started', £320. Tel: Horsham (0403) 51315.
- **SINCLAIR QL** latest JM operating system. Immaculate condition, almost new, faultless performer. Reason for sale — bought new Apricot. £340. Tel: Gordon (Cobham) 0932 63522 eves.
- **EPSON TX80B** (predecessor to MX80) printer, 125 CHR5/SEC, prints full ASCII, 80 col, Centronics compatible interface, tractor feed only. Brand new, never used (boxed) £120 ono. Tel: 0753 651904.
- **COMMODORE 64**, 1541 disk, Simons Basic plus Easy Script. For sale; as a set only. Save over £150, £300. No offers. Tel: 0276 34835 eve and weekends.
- **APPLE II plus**. 48k, with disk, monitor, joystick and software. Sensible offers only please. Possible swap for BBC. Tel: Fareham (0329) 231873 after 6.
- **SINCLAIR QL** with Division medium resolution, 14inch colour monitor, RS232 and monitor leads unused (checked only) £595. Tel: 0758 86207 eve after 7.30pm.
- **TANDY model three**. Twin disk drives. Business and games software, over 30 disks, £800 ono. Tel: Leicester 708449 or Beaulieu 612238.
- **TRS-80 Model-1** software to clear. Cassettes and disks, business, games including adventures, and utilities including Microsoft Editor/Assembler-Plus. No reasonable offer refused. Call St. Albans (0727) 50727 anytime.
- **TANDY TRS-80 Model-III**, Basic. Good condition. Plus editor-assembler, speech synthesizer, software, sound amplifier, books, and documentation, all boxed, leads 80-micro magazines, all for £350 ono. Tel: 01-908 3748 after 6pm.
- **IBM personal computer** 192k, 200. NEC hi-res colour monitor, IDS 560 Paper Tiger printer. All in excellent condition, loads of software. Reasonable offers considered. Tel: 051-334 8573 eve or weekends.
- **AMSTRAD CPC404** colour computer includes software and 2 year guarantee, £290. Oric-1 48k, includes software, books and attache case, £75. Mr. Berks, 43 Milford Court, Galemoor Avenue, Gosport, Hants. PO12 2TN. Tel: Gosport 520204.
- **ORIC 1 48k**, boxed and in mint condition. With Oricmon, M/code, monitor, assembler, disassembler, (worth £15). £70. Tel: David, 01-954 9180.
- **COMMODORE 3032**. Disk 3040, printer 3022, cassette, professional business software, manuals, 50 disks, £900 ono. Tel: Matthew 0903-45944 daytime 0903-41102 eve.
- **SHARP MZ-700**, Printer/plotter, data recorder, joystick, extra software and books. Excellent condition, £200. Tel: Aldershot 24461, ext 2668 (office hours).
- **NEC PC8000**. 64k RAM, 2 RS232, 1 parallel, 1 IEEE488 ports, expansion bus, 2 5/4in drives, CP/M, Basic, Z80 assembler £550. Fortran compiler £150. Cambridge (0223) 312630 or 314225.
- **NEC monitors**: green £60; colour £140. NEC dot-matrix printer, numerous fonts, £210. Cambridge (0223) 312630 or 314225.
- **SINCLAIR QL** £340. Zenith amber monitor £80. Cambridge (0223) 312630 or 314225.
- **TWO COMMODORE 3032**, 40 col, 32k, computers. 8050 and 3040 disk drives with cables and interface. Aprox 80 disks, payroll and stock programs, printer paper etc. £1,000 ono. Tel: Exmouth 273573.
- **WANTED: back issues of Dr Dobbs** 1983-4. Tel: 0521-50628.
- **COMMODORE 8096k**. 8250LP disk drive, Epson MX100. Wordcraft, VisiCalc and lots software. Suit business. CPM Softbox included to run Wordstar etc, £1,500 + VAT. Mr. Somerville 021-706 9748. Home 056482 4128.
- **SIRIUS 1.2**. 256k expansion card, Wordstar, D/ Base II, Rescue, graphics toolkit. New style, all cream finish and 10 function keyboard. Boxed and guaranteed. Sell to best offer around £1,400. Tel: Watford 46955.
- **TRS-80 Model I Level II**, 48k, expansion interface, green screen monitor, lots of software, Forth, Pascal, assembler, word processor, adventures, etc. Books and 80-micro mags. £150. Tel: Metheringham (Lincs) 22109 eves.
- **VIC 20**. C2N cassette guaranteed until April 1986. 16k switchable RAM, games worth over £250, educational software worth £50, and programs. All in good condition for only £270. Write to B. Kaur, 28 Kentish Road, Handsworth, Birmingham B21 0AX.
- **BBC B, OS1.2** with 'Exmon' and 'Wordwise'. Twin 100k disks. Epson FX-80 printer, plus leads, manuals, books, games, and paper. £900, no offers. Tel: Whitchurch (0948) 840285 after 5.30pm.
- **EPSON FX80** printer, Six months old, rarely used. With all cables and paper, £325. Tel: 01-624 7460.
- **BROTHER EP44 NLQ** electronic typewriter/printer with RS232 interface. Used very little. Complete, boxed as new with spare ribbons and paper, £185. Tel: 061-440 0900 after 6pm.
- **SHARP MZ-80A**, 48k. Integral monitor and cassette, excellent condition, as new. 80-col mod, includes Sharp software, Wdpro, manuals, books, expanded Basic, Epson printer interface. £325. Tel: Newcastle (091) 2855260.

TRANSACTION FILE ADVERTISEMENT FORM

All Transaction File ads must be submitted by readers on this form or a photocopy of this form. Maximum 30 words. Print one word per box, very clearly. Name, address and/or telephone number must be included in the 30 words. All ads must be accompanied by a flat fee of £2.50. Make cheques or POs payable to *Personal Computer World*. Ads accepted from private readers only. Ads cannot be repeated (unless sent in on another form) and we cannot guarantee to print an ad in any specific issue. Please help our typesetter to help you by printing your ad very clearly. Send your completed form to: Transaction File, PCW, 62 Oxford Street, London W1A 2HG.

Please find enclosed my cheque/PO for £2.50 for the following Transaction File ad.

WRITING FOR PCW

Your chance to contribute to the magazine.

We're offering readers a chance to get rich (well, at least richer) and to influence what's published in the magazine — by writing for it. We welcome approaches from would-be writers, including those who have never appeared in print before. It's often users with practical experience who have the most interesting things to say, so don't worry if your prose is less than perfect, we can take care of the polishing.

If you have an idea for a feature write, with a brief synopsis, outlining the proposed structure and content. If your article is already written, then send it in

for consideration. Remember to put your name and address on both the covering letter and the manuscript — along with a daytime phone number if possible. Manuscripts should be typed or printed out (dot matrix output is fine), in double-line spacing with ample margins top and bottom and on each side.

Any accompanying program listings should be supplied on disk or cassette, ideally with a printout as well.

We'll try to return all submissions sent in with a suitable sae, but make sure you keep a copy of everything you submit as well.

Bear in mind that it's worth taking a look at the Back Issues advertisement to see what sort of things we have already published — after all there's no point in reinventing the wheel. And please be sure to tell us if you've contacted another magazine (perish the thought): it would be very awkward if the same article appeared elsewhere. Frankly, we're more likely to accept something which has been offered exclusively to us.

Finally, we do pay for published work — the rate is £65 per 1000 words, and payment usually follows about four-six weeks after publication. **END**

DIARY DATA

Readers are strongly advised to check details with exhibition organisers before making arrangements, in order to avoid wasted journeys due to cancellations, printer's errors, etc.

London	(Barbican), Int Computer Graphics User Show & Conference. Contact: Montbuild Ltd, (01) 486 1951	19-21 Feb
Blackpool	(Winter Gdns), Northern Amusement Equipment & Coin Operated Machines Exbn. Contact: Jack Rose Exbns Ltd, (01) 855 9201	19-21 Feb
London	(Barbican), PC Trade Show. Contact: EMAP Int Exbns Ltd, (01) 837 3699	26-28 Feb
London	(Olympia), DEXPO Europe (Digital Equipment, Hardware & Software Exbn). Contact: CGP Ltd, (01) 582 9256	6-8 March
Glasgow	(Anderston Centre), Scottish Computer Show & Conf. Contact: Cahners Exbns Ltd, (01) 891 5051	12-14 March
USA	(Anaheim), COMDEX/Winter (Computer Conf & Exbn). Contact Interface Group Inc, 300 First Ave, Needham, MA 02194	21-24 March
London	(Olympia), INFO 85 (Information Technology & Office Automation Exbn). Contact: BED Exbns Ltd, (01) 647 1001	26-28 March

LEISURE LINES

Brain-Teasers from J. J. Clessa

Quickie

This month's quickie has an educational slant. In a mixed class of a certain school, each girl student can see as many girl students as she can boy students. But each boy student can see twice as many girl students as he can boy students.

How many boy and girl students are there in the class?

Prize Puzzle

I have a box full of equal sized ball bearings. The total number of ball

bearings happens to be a perfect square greater than 4. It is possible to construct a triangular pyramid using every ball bearing.

What is the least number of ball bearings that I could have. Note — in a triangular pyramid, the layers contain 1, 3, 6, 10 ball bearings and so on.

Answers please, on postcards only (letters will be disqualified), to PCW Prize Puzzle, March 1985, Leisure Lines, 62 Oxford Street, London W1. Entries to arrive not later than 31 March 1985.

November Prize Puzzle

We had exactly 100 entries for this competition. Program running times to solve the problem ranged from five and a half days on a Spectrum to two minutes on an HP9816. But, since one HP9816 owner said it took 26 hours, I suppose the timings reflect the quality of the programming rather than of the hardware.

Some readers said it couldn't be done, but, to show they are wrong, the required answer is 2199978, which divides with 8799912 exactly, giving a

quotient of 4.

Incidentally, as several of you observed, if you add or remove 9's from

the middle of this number the property still remains.

The winning entry comes from Mr.

Claes Malcolm from Sweden. Congratulations Claes (or is it Malcolm?), your prize is on its way.

NUMBERS

Problems with primes from Mike Mudge.

Definitions A Prime number is a positive whole number which is exactly divisible by itself and unity only. Thus the sequence of primes begins 2, 3, 5, 7, 11, 13, 17, 19, ...

A truncatable prime number is a prime which yields a sequence of primes when successive digits are removed: always from the left (for a left-truncatable prime), always from the right (for a right-truncatable prime), or simultaneously from the left and right (for a shrinking prime). For example: 629137 is left truncatable since it is prime and so are 29137, 9137, 137, 37, & 7. 939133 is right-truncatable since it is prime and so are 39133, 9133, 133, 33, & 3.

The State of the Art Angell IO and Godwin HJ 1977 *Mathematics of Computation*, vol 31 page 265, have tabulated, to base ten, the largest left-truncatable prime, L_a , with base a between 3 and 11 inclusive also the largest right-truncatable prime, R_a , with base a between 3 and 15 inclusive.

Keith Devlin in *The Guardian* (8/11/84) broadened the problem, base 10, by admitting 1 as a prime. He stated that there are 147 R_{10} the largest being 1979339339. (This reducing to 83 with largest 73939133 if 1 is excluded.)

Further Devlin counted 403 L_{10} less than 10^4 (this reducing to 308 with the exclusion of 1) together with a total of 24

shrinking-primes (reducing to 9 with the exclusion of 1).

The problems set are:

(i) Reproduce the above results.
(ii) Extend the range of a quoted by Angell & Godwin for L_a & R_a .

(iii) Consider shrinking-primes, S_a , in bases different from 10.

(iv) Investigate what happens if a given prime is to be successively truncated by the removal of primes from either or both ends.

Readers are invited to submit their program listings, together with hardware descriptions, run times, any comments and of course the output relating to some (or all) of the above problems. These will be judged for accuracy, originality and efficiency (not necessarily in that order), and a prize will be awarded to the 'best' entry received by 1 June 1985.

Please address all correspondence to Mike Mudge, 'Square Acre', Stourbridge Road, Penn, Nr Wolverhampton, Staffordshire WV4 5NF. Tel 0902 892141.

Please note that submissions can only be returned if a suitable stamped addressed envelope is provided.

Expanded reviews of previous problems together with, subject to the approval of the contributor, copies of detailed programmes from the prize winning entry may also be requested.

Prize winner

(Factorial n) + 1 is prime for the following n less than 231: 1,2,3,11, 27,37,41,73,77,116, & 154.

(Primorial p) + 1 is prime for the following p less than 1031: 2,3,5,7,11, 31,379,1019, & 1021.

This month's prizewinner is Gareth Suggett, Chichester, Sussex. Readers should be encouraged by the incompleteness of the winning submission. Gareth has put all of the primes up to 65063 on a data file and implemented some generalised arithmetic routines in Basic on his BBC Micro, in spite of recurring hardware problems. Primorials up to 101 digits and factorials up to 72 digits have been listed. However, the tests for N.T.P. are incomplete being conditional on extending the data file and efficiently coupling it to the remaining programme in a factorisation routine.

Two related areas remaining for investigation are:

a) Define $A_n = n! - (n-1)! + (n-2)! - \dots - (-1)^n 1!$ A_n is prime for $n = 3, 4, 5, 6, 7, 8, 10, 15, 19$ at least; whilst $n = 27$ yields the first A_n with a square factor. When are the A_n N.T.P.?

b) The left factorial function is defined by: $!n = 0! + 1! + 2! + 3! + \dots + (n-1)!$ When is $!n$ prime or N.T.P.?

MICROCHESS

Kevin O'Connell bets on Chaos in the North American Computer chess championship.

The game which follows was played in the last round of the 15th North American Computer Championship, held in San Francisco last October.

The game is proof of grandmother's old saying that one should never bet on a proposition.

White: Chaos. Black: Phoenix. Benoni Defence

1	d2-d4	c7-c5
2	d4-d5	e7-e5
3	e2-e4	d7-d6
4	c2-c4	g7-g6
5	Nb1-c3	Bf8-g7
6	Bf1-d3	Ng8-e7
7	Ng1-e2	O-O
8	Bc1-d2	

(A typical position out of the Old Benoni Defence, which shows the great progress made by programs in the last

few years. It is very important here to retain freedom of movement for the f-pawns and both programs seem to understand this.)

8	...	f7-f5
9	f2-f3	Nb8-a6
10	Bd2-g5	Na6-b4
11	Bd3-b1	h7-h6
12	Bg5-h4	g6-g5
13	Bh4-f2	f5xe4
14	Bblxe4	

(Having e4 for his pieces promises White some advantage.)

14	...	Bc8-f5
15	O-O	Qd8-d7
16	a2-a3	Nb4-a6
17	Qd1-b3	Na6-c7
18	Be4xf5	

(The start of an interesting but very risky plan. This makes the c6 square

available to White's queen. However, the net result of the whole manoeuvre is merely a very weak white pawn on c6.)

18	...	Ne7xf5
19	Qb3xb7	Rf8-b8
20	Qb7-c6	Qd7xc6
21	d5xc6	Rb8xb2
22	Ra1-b1	Ra8-b8
23	Ne2-g3	Rb2xb1
24	Rf1xb1	Rb8xb1+
25	Nc3xb1	Nf5-e7
26	Ng3-e4	Nc7-e8
27	Ne4xd6	

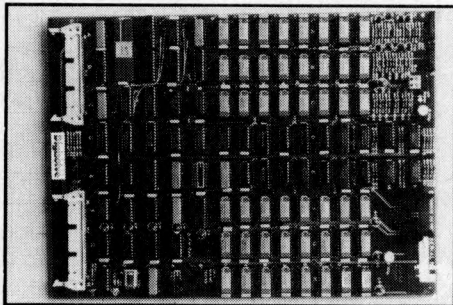
(A horrible decision to have to make, but against anything else Black simply removes the pawn on c6 and then builds up his central power-house.)

27	...	Ne8xd6
28	Bf2xc5	Ne7-c8
29	Nb1-d2	Kg8-f7

GRAPHICS

DIGISOLVE offer you a way to increase your graphics speed and resolution. Using a high speed graphics processor, our cards draw lines and characters FAST. The graphics processor works in parallel to the host machine and gives you the power of using a co-processor specifically designed for graphics. With drawing rates of up to 1,500,000 pixels per second, lines appear instantly to speed up your plotting.

With the resolution, we offer new possibilities for software and systems, both in monochrome and colour on a large range of computers.



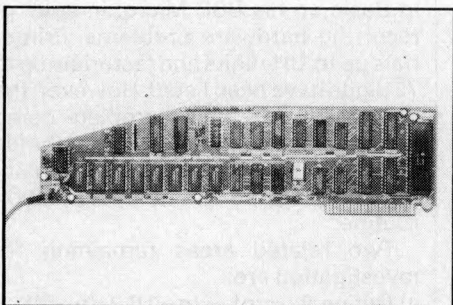
COLOUR GRAPHICS CONTROLLER

DIGISOLVE offer you high resolution colour graphics too. Designed to plug into any computer with a bus host adaptor. The VGP64 gives you 512 x 512 pixels in 64 colours. With its own vector processor and 384K bytes of memory, your computer can become a sophisticated graphics system. **64 COLOURS** or 8 if you insist, not many do! **4096 COLOURS** now you can really paint a picture. **384K BYTES of RAM** or 768K Bytes with 4096 displayed simultaneously. **2 PICTURE BUFFERS** give you help with animation. **GREY SCALE OUTPUT. EXT VIDEO SYNC LOCK** available for making video tapes. **APPLE, SAGE, PET, IBM, S100, VME BUS, RS232**, centronics, all have interfaces available to make use of our fast hardware. New ones are coming along all the time so give us a ring if your requirement is not listed.

8 COLOURS £899, 64 COLOURS £999
4096 COLOURS £2000 + P&P + VAT

The above prices are box units including power supply but excluding computer interface.

SOFTWARE PACKAGES: Painting and Slide generation, Business graphics, Architectural 3D design.



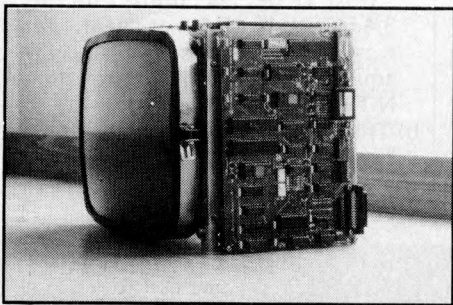
APPLE II

DIGISOLVE's Apple II High Resolution Vector Graphics Processor card quadruples the screen resolution and saves using up your Apple's memory. The enhanced Applesoft support disc supplied with our card provides powerful graphic functions and simplifies the conversion of existing software.

512 x 512 pixels resolution. FAST 1,500,000 pixels per second. **MEMORY** an extra **64K** on the card. **TEXT** to 85 characters by 57 lines. **CURSOR** drawing features. **SOFTWARE** 18 new functions are added to Applesoft and extra utilities too, all with source listing. **OUTPUT** to a dot matrix printer or save images on a disc. **PASCAL** and **TASC** Compiles supported too.

£399.00 + P&P + VAT

SOFTWARE PACKAGES: Art and Design, Business graphics, Painting, Slide generation packages. Architectural design and modelling, Kitchen design and Visicalc prebooks.



VDU BOARD

DIGISOLVE offer you the cheapest way to make a scrolling VDU with our intelligent 80 x 24 VDU card. With over 50 control functions, the card works up to 19.2K baud.

80 x 24 DISPLAY optional 40 x 24 or 40 x 12.

TRUE DESCENDERS on properly formed characters in an 8 x 12 matrix.

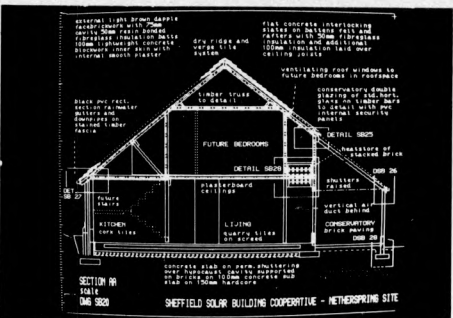
BLOCK GRAPHICS

FULLY SCROLLING display

UP TO 19.2K BAUD via RS232 communications port.

KEYBOARD AND RS232 DATA INPUT

£180.00 (1 off) + P&P + VAT



COLOUR GRAPHICS TERMINAL

The new **FRONTIER** monochrome and colour high resolution graphics terminals are fully compatible with Tek 4014 terminals at an amazing price. The high line rate flicker free monitor and advanced electronics provide an exceptional graphic display terminal.

512 x 720 DISPLAY, 1K x 1K STORED PICTURE PAN, ZOOM & SCROLL to move the display about. **LOCAL EDITING** with macros and software definable character fonts.

PALLETTE OF 4096 COLOURS

FLICKER FREE DISPLAY due to high line rate monitor and advanced electronics working non-interlaced.

19" SCREEN OPTION AVAILABLE

PRICES FROM £1495.00 + P&P + VAT

CUSTOM DESIGNS

DIGISOLVE have staff dedicated to design consultancy and are helping many industrial users with custom design packages. Our experience in designing display equipment, character or graphic based, and microprocessor controllers may help you with your special projects. Please do not hesitate to contact us if you require further details.

Digisolve

DIGISOLVE LIMITED
AIRE & CALDER WORKS
CINDER LANE
CASTLEFORD
W. YORKS WF10 1LU
(0977) 513141 (6 lines in), 513382, 510511
TELEX 557661 AGRAM

APPLESOFT IS COPYRIGHT APPLE COMPUTER • TEK 4010 IS COPYRIGHT TEKTRONIX • SCRIBE IS COPYRIGHT ECOTECH LTD

MICROCHESS

30 Kg1-f2 Kf7-e6
31 Kf2-e3 Nd6xc4+

(Black is winning and this is one way to 'simplify' the position. However, although this increases Black's material advantage, it actually exacerbates the technical difficulties. I would have preferred 31...Bg7-f8, preparing to release the pent-up bishop and ensuring that the white king has no way into the position.)

32 Nd2xc4 Ke6-d5
33 Bc5-b4 Kd5xc4
34 Ke3-e4 Kc4-b5
35 c6-c7 Kb5-b6
36 Ke4-f5 a7-a5
37 Bb4-c3

(Tournament Director Mike Valvo had just announced to the crowd that it was only a matter of time and technique before Black would win. My colleague David Levy was present, operating the Intelligent Chess Software program.

Since it had just won its game, and since David had nothing else to do, and since he has been known to make the occasional wager... he now bet one of White's programmers \$5 (well, it is not always possible to play for high stakes) that Chaos would not lose. The bet was accepted.)

37 ... Kb6xc7
38 Kf5-g6 Bg7-f8
39 Bc3xa5+ Kc7-c6
40 Ba5-b4 Bf8xb4
(This is very dangerous indeed. Better 40...Nc8-d6.)

41 a3xb4 Nc8-e7+
42 Kg6xh6
(Black is not losing yet, but the technical difficulties are now immense and David could not resist offering 'double or quits' that Chaos would now win. The further bet was taken up.)

42 ... g5-g4
43 Kh6-g5 g4xf3

44 g2xf3 Kc6-b5
(The start of a manoeuvre which puts both of Black's pieces way over on the queen-side, thus making it impossible for Phoenix to stop White's king-side pawns.)

45 Kg5-f6 Ne7-d5+
46 Kf6xe5 Nd5xb4
47 h2-h4 Nb4-d3+
48 Ke5-f5 Nd3-c5
49 f3-f4 Kb5-c6
50 h4-h5 Nc5-d7
51 h5-h6 Nd7-f8
52 Kf5-f6 Kc6-d7
53 Kf6-f7 Nf8-h7
54 Kf7-g7 Kd7-e7
55 Kg7xh7 Ke7-f7

(It is almost possible to keep White's king trapped, but not quite, so...)

56 f4-f5 Kf7-f6
57 Kh7-g8 1-0
(and one of Intelligent Software's partners was \$10 richer.)

ACC NEWS

Rupert Steele keeps you up-to-date on computer clubs.

The Association of Computer Clubs (ACC), is the national representative and liaison body for computer clubs around the UK. It is a democratic, non-profit making association run by and for its members through a council consisting of representatives of the computer clubs that are paid up affiliates of the ACC.

The ACC runs a number of services for clubs and for computer enthusiasts interested in the computer club movement.

We offer a free, public liability, insurance scheme and a low cost, equipment insurance scheme for affiliated club meetings. A network of regional contact points is being set up (anybody interested in being a regional contact, please contact me), and we are active on the Prestel database with ClubSpot 810.

ClubSpot is made available by Prestel, for the Hobby Computer Movement. Once accepted as an editor, and trained at one of our regular conferences, you would be able to edit material on behalf of your club, on the national Prestel system. If you are interested in being a ClubSpot editor, please contact Andy Leeder, Church Farm, Stratton St Michael, Norwich, NR15 2QB or call 0508 30355.

This month, I shall look at some of the various National User Groups that support different micro systems.

Attention NewBrain users! There is an internationally recognised user group for you. It is called Open #Stream and the chairman and contact is Philip Crookes, 26 College Road, Bromley, Kent, BR1 3PE, or call 01-290 5262. The annual subscription is £10, from June to

June (free if you're disabled), for which you get all the group's publications, including four copies of the 16 page newsletter. Also available are ROM listings, fully commented, showing the paged operating system, disk controller module, the paged Basic and the CP/M BIOS. Not to mention a variety of public domain programs for the expanded and unexpanded New-Brains, a version of Basicode and a number of languages. The club is affiliated to NewBrain user groups in Holland, Denmark and Italy; and is planning to hold meetings in Central London (possibly also Manchester and Scotland).

There has been a change of secretary at the Forth Interest Group (UK). The new man is Douglas Neale, 58 Woodland Way, Morden, Surrey. The group continues to meet on the first Thursday of the month in room 307 of the Polytechnic of the South Bank, London, at 7pm. The membership is now around 700 in total and it is proposed to organise local chapters of FIG outside London.

Serious business users might take note of the Sirius and Apricot User Club, Electron House, 27 Cardiff Road, Luton LU1 1PP, or on 0582 412214. Not exactly an amateur club, this outfit is run as a business — but if you are using Apricot or Sirius professionally you would do well to take a look. They run a telephone hotline, seminars, newsletters, discount schemes, hardware and software exchange schemes, training schemes and much more.

BBC disk system users — have you joined the Format 4080 Club? It is run by Peter Hughes of 5 Marsh Street, Bristol

BS1 4AA. The club operates by distributing a disk six times a year, containing both a newsletter and software for members to run. Both 5.5 and 3 inch disks are available. Other products are offered on special offers with each issue of the 'ClubDisk'.

Memotech users may be interested in GENPAT, said to be the official user club for Memotech MTX and FDX systems. I understand that this club is recognised by the manufacturer. The annual subscription is £16, which covers 12 editions of the club magazine, 'Memopad', and 'all the usual benefits of membership of a user group'. Write to Mr K Hook, 3 Bulcock Street, Burnley, BB10 1UH, for details.

Oriental speaking, are you interested in the Sord-Pips Users Club? If so, contact Peter Kuhn, 134 Marlow Drive, North Cheam, Surrey SM3 9AS.

Texas Instrument TI 99/4A users may be interested in the TI 99/4A Exchange, which is the UK user group for this, now discontinued, machine. There is a quarterly newsletter called TI*MES with a wide variety of material included. The annual subscription is £6, and the group (which is a non-profit organisation), is supported only by its members. For full details, contact TI99/4 Exchange, 40 Barrhill, Patcham, Brighton BN1 8UF.

REMEMBER: If you are interested in the ACC's services, or would like to find out about a computer club near you (or for your machine), or would like a mention for your club in this column, please write to me: Rupert Steele, 17 Lawrie Park Crescent, London, SE26 6HH, or call 01-370 0601.

END

BRITAIN'S BEST S/W PRICES?

Discount Price	Discount Price
WordStar.....190	DBase II.....235
Easy Accounts.....295	DBase III.....320
Lotus 1-2-3.....285	Open Access.....320
SuperCalc II.....135	Symphony.....425
SuperCalc III.....210	DMS Delta 2.....370
Turbo Pascal.....44	Friday!.....135
Framework.....320	Sidekick.....44

- ★ WordStar professional — now only £270!
- ★ We will endeavour to better any other advertised price in this issue, please call.
- ★ Please call for anything not listed above.
- ★ All goods will normally be delivered within two working days.
- ★ Please state micro type, operating system and disc format when ordering.
- ★ Please enclose cheque with order where possible including £4 p&p + 15% VAT.
- ★ We supply government, local authorities etc... on receipt of official orders.
- ★ All prices subject to change at any time.

MICROSTAR SOFTWARE
106 LONDON ROAD
LEICESTER LE2 0QS
Telephone: (0533) 544601



TEL: (0423) 65270

COMPUTER REPAIRS
AND MAINTENANCE
82 MEADOWCROFT
BILTON
HARROGATE
N. YORKS.

C-RAM

YEARS OF EXPERIENCE

SPECTRUM REPAIRS ALL INCL. £18.50
SPECTRUM UPGRADES ALL INCL. £32.00

WE REPAIR OTHER MAKES TOO!!

REPAIRS ARE OUR SPECIALITY BOTH FOR THE
PUBLIC AND TRADE SECTORS

We also supply competitive priced peripherals —
examples:

Acorn Disk interface kit £99.99 + P&P £1
TEAC 100K 40T, s/s, s/d, disk drive, £114.95 +
P&P £7

Computer compatible tape recorder, tape coun-
ter etc, £18.50 + £2 P&P

C15 data tapes, 35p each, 10's only

AND MUCH MORE! — Send for price lists
enclosing SAE

'GOOD SERVICE COSTS LESS THAN BAD SERVICE'
A. & P. CALPIN



GEMINI MULTINET GALAXY IV

Central file server
Three workstations
A GM825 SUPER STATION

Five terminals. Software inc: CP/M,
dBase II etc, with manuals. This
system is almost new and in perfect
order.....£3,500

TWO RAIK BLACK BOXES

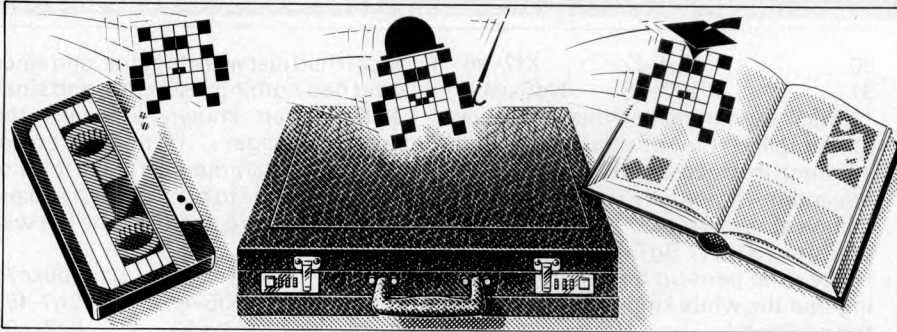
3/30S Hard disk

Insight 'Wordstar' terminals. Software
inc: 'Wordstar', CP/M+ 2.3E, MP/M II
etc, with manuals..... £900-£1,200

Contact: DAVID NISSEN
01-521 7733

Other systems available — please
ring for details. Apple systems in stock

PROGRAM FILE



*Nick Walker selects the best of readers' programs — for
details on submitting your own, see the end of this section.*

The most common objection to the Commodore 64 is its abysmal Basic — anything remotely clever ends up as an encrypted tangle of POKes. The program of the month turns the 64 into something usable, and gives a Basic programmer simple access to the sprites and music capabilities. In total 29 new commands are added to the Basic, all of which can be used in the normal way. As the program is in machine code, it can be POKed in with the top of memory lower and the original Basic deleted. This way it occupies only a few hundred bytes, leaving plenty of room for a Basic program, and the commands operate faster than their equivalent POKes.

Following the NewBrain assembler published last month, there's a machine code monitor of truly exceptional quality. Some of its more outstanding features that place it on a par with commercial products are: a program relocater that updates all the addresses so that the program still runs in its new location; a block move; intelligent search and replace; and a disassembler.

BBC owners can produce professional smooth scrolling of text and graphics with the smooth scroll routine published this month. Text on a graphics screen has always been a problem for Atari owners, but is elegantly solved with the Multi-Mode Text program. Although short it's very powerful when

offering text in any graphics screen, and features numerous other niceties.

On the games side there's a Pengo-like arcade game for the Research Machines 380Z and 480Z, and multi-player puzzle game for the Beeb with a clever computer opponent.

Finally, a few loose ends to tidy up. My apologies go to Jeff Aughton who wasn't credited in the intro to Simon Biggs' Golf program (November 1984). This was in fact a conversion of the original Pet Golf program written by Jeff and published over two years ago.

If N Thomas, author of the Commodore assembler program which was printed in the September 1984 issue would contact me, he may discover something to his advantage.

Although the first programs for the Amstrad, QL and MSX are drifting in, they are nothing compared with the demand for quality programs to be published. So, if you have written anything substantial or clever, then do send it to me.



Games



Scientific/mathematic



Business



Toolkit/utilities



Educational/Computer
Aided Learning



Program of the Month Commodore 64 Scroffs Basic by David Gristwood

I like this program — not just because it's an excellent program that adds 29 new commands to Commodore Basic, but also because all the commands are fully described within the REM statements of the listing. Here's a brief description of the commands:
CLS — clears the screen.
PAPER X — changes the colour of the main screen (paper), X between 0 and 15.

EDGE X — changes the colour of the border, X between 0 and 15.

AT X,Y — is used in conjunction with PRINT to position text anywhere on the text screen.

JUMP X — calculated GOTO, jumps to the line number in X.

KEY — waits for any key to be pressed.

YNKEY — waits for either the Y or N keys to be pressed.

PAUSE X — pauses X seconds.

PROGRAM FILE

EXIT — switches off Scroffs Basic.
 CFILL X — fills colour matrix and hence printed colour.
 SFILL X — fills the screen with the ASCII character corresponding to X.
 REPEAT . . . UNTIL (cond) — normal REPEAT UNTIL loop.
 FPOP — allows GOTO exit from a FOR loop without confusing the next FOR loop.
 GPOP — allows GOTO exit from a GOSUB without confusing the next GOSUB.
 RVS — reverses everything on the screen.
 VOL X — sets the volume and selects the type of filter for subsequent sound commands.
 VX X — selects the voice (0 to 3) for subsequent sound commands.
 ENVEL Attack, Decay, Sustain, Release — defines the envelope to apply to a voice.
 MUSIC X — sounds the selected voice at frequency X, plays the note.
 PULSE X — applies a pulse to the voice, X defines width of pulse.

PLAYX — POKEs the control register for current voice.
 FILTFQ X — defines the cut-off frequency for a filter.
 FILTER X — switches on any combinations of the three filters.
 SPRITE X — selects the sprite for further sprite commands to act on, X between 0 and 7.
 MOBCTRL X — turns on or off any combination of sprites.
 COLSP X — changes the colour of the selected sprite.
 XSP X — is the x coordinate of the selected sprite.
 YSP X — is the y coordinate of the selected sprite.
 After typing in and running the program, typing SYS 36864 will enable the extra to be used. After that it is possible to get rid of the program and use the commands for your own programs. LOADING and SAVEing programs will not effect Scroffs Basic — the only way to disable the commands is to either switch off the machine or use the EXIT command.

```

100 REM *****
150 REM * SCROFF'S BASIC 1.0 *
200 REM * FOR THE COMMODORE 64 *
250 REM * BY DAVID GRISTWOOD *
300 REM *****
350 REM
400 POKE 55,0:POKE 56,144:CLR:REM RESERVE 4K OF MEMORY
450 CLST=9*4096+12*256:CZ=0
500 PLLST=9*4096+15*256:PHLST=PLLST+8*16:PZ=0
550 BL$=""
1000 REM
1005 REM * INTRODUCTION *
1010 REM
1050 PRINT CHR$(8):PRINT CHR$(142):PRINT CHR$(147)
1100 PRINT TAB(8)"WELCOME TO SCROFF'S BASIC":PRINT
1150 PRINT" WHEN RUN, THIS PROGRAM ADDS 29 EXTRA"
1180 PRINT" COMMANDS TO BASIC. THE 'REM'S IN THIS"
1200 PRINT" PROGRAM GIVE FULL DETAILS OF THESE NEW"
1240 PRINT" COMMANDS AND HOW TO USE THEM."
1260 PRINT:PRINT" LOADING DATA NOW. PLEASE WAIT."
1280 GOTO 2000
1300 REM
1305 REM * DATA ERROR ROUTINE *
1310 REM
1315 REM PRINT ERROR MESSAGE THEN STOP
1320 PRINT:PRINT"?BAD DATA ERROR IN LINE";
1340 PRINT PEEK(63)+256*PEEK(64)
1360 END:GOTO 1360
1400 REM
1405 REM * LOADING SUBROUTINE *
1410 REM
1420 REM READS IN A HEX NUMBER OF LENGTH DG
1450 AZ=0:READ AZ$
1460 IF LEN(AZ$)<>DG THEN 1300
1470 IF AZ$="ZZ" OR AZ$="ZZZZ" THEN RETURN
1480 FOR T1=1 TO DG
1500 :TV$=MID$(AZ$,T1,1):TV=ASC(TV$)
1520 :IF (TV>47ANDTV<58) OR (TV>64ANDTV<71) THEN 1560
1540 :GOTO 1300
1560 :V=VAL(TV$):IF V<>0 OR TV$="0" THEN 1600
1580 :V=TV-55
1600 :AZ=AZ+(V*16^(DG-T1))
1640 NEXT T1
1680 RETURN
2000 REM
2005 REM * MAIN LOADING ROUTINE *
2010 REM
2040 REM READ STARTING ADDR OF ROUTINE
2050 DG=4:GOSUB 1400:IF AZ$="ZZZZ" THEN POKE CLST+CZ,0:END
2080 AZ=INT(AZ)-1:AH=INT(AZ/256):AL=AZ-(256*AH):ADDR=AZ+1
2100 POKE PLLST+PZ,AL:POKE PHLST+PZ,AH:PZ=PZ+1
2140 REM READ NAME OF ROUTINE
2160 READ NAME$:IF LEN(NAME$)<2 THEN 1300
2200 FOR I=1 TO LEN(NAME$)
2220 :NAME=ASC(MID$(NAME$,I,1)):IF NAME>64 AND NAME<91 THEN 2250
2240 :GOTO 1300
2250 :IF I=LEN(NAME$) THEN NAME=NAME+128
2260 :POKE CLS1+CZ,NAME:CZ=CZ+1
2280 NEXT I
2400 PRINT CHR$(19):FOR I=1 TO 9:PRINT:NEXT I
2440 PRINT BL$:PRINT CHR$(145);," ROUTINE: ";NAME$
2500 REM READ IN DATA FOR ROUTINE
  
```

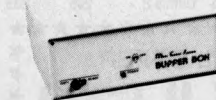
MICROMART

Set your micro free! WITH HARDWARE Data Buffers

Don't wait for printing to finish — no matter how fast your printer, your computer works faster.

Release that micro for more processing, seconds after giving the command to print out.

Save time by using a data buffer. And remember, computer time saved means operator time saved.



Word-processing and all print-orientated tasks can be speeded-up dramatically.

Graphics and CAD output — a data buffer is a must for these applications.



Cost-effective time saving. From £87.50 for 16K of buffer memory (for use with Epson printers). 64K buffer memory with optional serial or parallel input or output £199. Full-featured (copy, output hold, etc) 256K buffer memory. £423. Prices exclude VAT. Trade, quantity, and corporate terms — please call.

A>Line Computer Systems MICRO BUFFER DISTRIBUTORS

1 Church Farm Lane,
 Willoughby Waterleys,
 Leicestershire, LE8 3UD.
 ☎ Peatling Magna (053 758) 486

-MICRO MEDIA-MICRO MEDIA-

DISKS — SAVE £££££s

CDC 5¼"	PER BOX	Total inc p&p & VAT
SS/DD	£10.90	£13.20
3M 5¼"		
SS/DD	£13.90	£16.60
DS/DD	£19.30	£22.75
SS/QD	£19.95	£23.50
DS/QD	£23.50	£27.60
MAXWELL 3½"		
SS/DD	£34.25	£40.10
DS/DD	£54.00	£62.80
DISK STORAGE		
10×5¼" SEE 10	£1.95	£2.60
40×5¼" ABA Lock-lid	£13.50	£17.50
90×5¼" ABA Lock-lid	£16.50	£21.30
60×3½" ABA Lock-lid	£17.00	£21.60

Ring us for equally incredible prices on:
 RIBBONS, LISTING PAPER, 8" DISKS, LABELS,
 ACOUSTIC HOODS, FIRE SAFES, ETC

Cheques payable to MICRO MEDIA
 Rydal Mount, Baker Street, Potters Bar
 Herts EN6 2BP

Tel: 0707 52698

-MICRO MEDIA-MICRO MEDIA-

BEST UK SOFTWARE PRICES?

Buy from TriSoft Ltd., the specialist software company formed by microcomputer consultants.

- ★ Over 400 leading software packages (inc. Apple)
- ★ Independent advice in making your choice
- ★ Professional staff + network of consultants
- ★ Most formats. All programs latest versions

SAGE ACCOUNTS £259

The new updated version (1.5) featuring many enhancements at only £259 (reduced from £375). Please telephone or write for details of all other Sage Accounting products and our Sage training programme.

List Price	Our Price	List Price	Our Price
Lotus 1-2-3	395	Psion Xchange	495
Symphony	550	Sycero	595
dBase III	495	Turbo Pasc. IBM 49	35
Framework	495	Spellbinder	320
Open Access	450	DRC Compiler	275
Supercalc II	195	Knowledgegman	450
Supercalc III	295	DMS Delta 2	495
Multiplan	179	Omnis 2	295

SPECIAL OFFER

D BASE II £229

INTERESTED IN ACCOUNTANCY SOFTWARE?

Having reviewed many of the accounting s/w packages currently available, we are now able to offer first class advice on the best accounting s/w for your business. One of the accounting systems which we supply and support is

PEGASUS

We have Midlands and London based staff who are fully trained in the application and use of Pegasus software.

WORDSTAR PROFESSIONAL £399 £265

All prices exclude VAT and carriage.
If you see any of these products genuinely advertised at a lower price we will improve upon that offer in most cases. Please phone or write for our comprehensive price list.

DEALER, CONSULTANT, GOVERNMENT AND OVERSEAS ENQUIRIES WELCOME

TriSoft Ltd

Castle House, Lea, Matlock
Derbyshire DE4 5GL
Tel: 062 984 383/719

Is your micro in touch
with the real world ?

The VIS1 intelligent
interface provides the
connection, with:

8, 12 & 16 bit DACs and ADCs
Isolated parallel input and output
Timing, counting and frequency metering
Programmable gain amplifiers
Signal multiplexing and filtering
Transducer conditioning
8, 16 or 32K RAM, 16K ROM, 2MHz 6809
RS-232 or IEEE-488 versions

Valewells Ltd
Laboratory Microcomputer Systems

15 CLARENCE PARADE
CHELTENHAM GL50 3PA
Telephone (0242) 570905

PROGRAM FILE

```

2520 DG=2:GOSUB 1400
2540 IF AZ$="ZZ" THEN 2000:REM END OF ONE ROUTINE
2580 POKE ADDR,AZ:ADDR=ADDR+1
2600 GOTO 2500
2980 REM
2990 REM
3000 DATA 9000, WEDGE
3020 REM *****
3040 REM * WEDGE *
3060 REM *****
3080 REM THIS IS NOT A NEW COMMAND FOR
3100 REM BASIC.THIS IS THE MACHINE CODE
3110 REM ROUTINE THAT LINKS THE EXTRA
3120 REM COMMANDS TO BASIC.IT IS CALLED
3140 REM BY A 'SYS' CALL:
3150 REM SYS 9*4096
3160 REM OR
3165 REM SYS 36864
3180 REM THIS MUST BE USED BEFORE ANY
3200 REM OF THE NEW COMMANDS WILL WORK.
3240 REM
3260 DATA A9,50,8D,08,03,A9,90,8D
3280 DATA 09,03,A9,30,A0,90,20,1E
3300 DATA AB,60,A9,E4,8D,08,03,A9
3320 DATA A7,8D,09,03,60,3E,FC,FF
3340 DATA 00,50,8D,08,06,C5,AE,00
3360 DATA 00,03,A9,36,A0,9F,CE,00
3380 DATA 28,43,29,20,44,41,56,49
3400 DATA 44,20,47,52,49,53,54,57
3420 DATA 4F,4F,44,20,31,39,38,34
3440 DATA 00,58,ED,8C,72,D4,28,FF
3460 DATA 20,73,00,20,59,90,4C,AE
3480 DATA A7,D0,03,4C,2B,AB,E9,80
3500 DATA 90,03,4C,F3,A7,A5,7A,48
3520 DATA A5,7B,48,A2,00,A0,00,B1
3540 DATA 7A,C9,41,B0,03,4C,89,90
3560 DATA C9,5B,B0,F9,9D,ED,90,EB
3580 DATA E6,7A,D0,02,E6,7B,4C,6F
3600 DATA 90,A9,00,9D,ED,90,AA,AB
3620 DATA 8D,B1,02,B9,ED,90,DD,00
3640 DATA 9C,D0,04,C8,4C,C3,90,BD
3660 DATA 00,9C,C9,B0,90,10,BD,00
3680 DATA 9C,38,E9,80,D9,ED,90,F0
3700 DATA 26,A0,00,4C,C3,90,A0,00
3720 DATA EB,BD,00,9C,C9,80,90,F8
3740 DATA EE,B1,02,E8,BD,00,9C,C9
3760 DATA 00,F0,03,4C,93,90,68,B5
3780 DATA 7B,68,85,7A,4C,A5,A9,C8
3800 DATA B9,ED,90,C9,00,D0,EF,68
3820 DATA 68,AC,B1,02,B9,80,9F,48
3840 DATA B9,00,9F,48,60,43,46,49
3860 DATA 4C,4C,00,20,13,10,01,03
3880 DATA ZZ
3890 REM
4000 REM THE FOLLOWING DATA IS FOR THE
4020 REM EXTRA BASIC COMMANDS.WITH EACH
4040 REM IS A COMPLETE DESCRIPTION OF
4060 REM WHAT EACH COMMAND DOES, HOW TO
4080 REM USE IT, WHICH PARAMETERS ARE
4100 REM REQUIRED AND EXAMPLES OF HOW
4120 REM THEY MIGHT BE USED IN A
4140 REM PROGRAM.
4160 REM THE DATA STATEMENTS CONTAIN
4180 REM THE MACHINE CODE INSTRUCTIONS
4200 REM IN HEX (BASE 16).
4260 REM THE FORMAT OF THIS PROGRAM HAS
4280 REM BEEN DESIGNED SO THAT NEW
4300 REM COMMANDS CAN EASILY BE ADDED.
4350 REM WARNING - DO NOT USE LOCATIONS
4360 REM $02A0-$02B5 (TEMP. WORK SPACE)
4390 REM
4400 DATA 9100, CLS
4420 REM *****
4440 REM * CLS *
4460 REM *****
4480 REM CLEAR SCREEN.IT IS THE SAME AS
4510 REM PRINT CHR$(147)
4520 REM BUT IS EASIER TO READ AND TO
4540 REM REMEMBER.THIS COMMAND COMBINED
4560 REM WITH THE 'AT' FUNCTION, WILL
4580 REM SAVE MEMORY & MAKE 'HARD COPIES
4600 REM OF PROGRAMS EASIER TO READ.
4620 REM IT REQUIRES NO PARAMETERS.E.G.
4640 REM 10 CLS:PRINT A$
4650 REM
4680 DATA A9,93,20,47,AB,60
4730 DATA ZZ
4740 REM
4800 DATA 9110, PAPER
4820 REM *****
4840 REM * PAPER *
4860 REM *****
4880 REM CHANGES THE BACKGROUND COLOUR
4900 REM OF THE SCREEN (THE 'PAPER').
4920 REM IT REQUIRES ONE PARAMETER, AND
4940 REM THE COMMAND TAKES THE FORM:
4960 REM PAPER X
4980 REM WHERE X IS ANY INTEGER IN THE
5000 REM RANGE 0 TO 15. THE NUMBERS ARE

```


PROGRAM FILE

MICROMART

READ & PRINT BAR-CODES USING ANY COMPUTER



Bar-codes give a speedy and error free means of data entry and provide a foolproof method of identification for any item or document. Typical uses include stock control, libraries, filing systems, security and checkpoint verification, point of sale terminals, spare parts identification, etc. etc. Already most grocery products are bar-coded at source and many other areas of industry and commerce are following. Bar-codes will soon be commonplace. Atek decoding algorithms have been developed over a period of years and are recognised as being second to none. (Others use our software under licence, in their own products.) All bar codes may be scanned bidirectionally, and our decoders easily exceed the industry standard benchmarks. (90% first time read and one substitution error per million reads).

All Atek decoders are housed in a smart instrument case with "ink-well" for the scanning wand when not in use. In addition they all come with software to print bar codes on a standard dot matrix printer. (Epson or compatible). a complete bar code identification system at minimal cost.

RS232 Bar-code reader

This microprocessor based unit decodes the bar-code and converts it into ASCII for transmission to the host via a RS232 port. Complete with power supply and cables. Works with virtually any computer. Baud rate, data format and optional check digit verification selectable with DIP switches.

£385.00 + VAT

NEW system for BBC micro

ROM based, interrupt driven software. Switch on and read bar codes! Nothing to load, no commands needed to start. Reads alphanumeric codes at power up and automatically inserts the data into the keyboard buffer so it is possible to control the computer entirely via barcodes! Decodes ALL these formats: EAN13, EAN8, UPC-A, CODE-39 & INTERLEAVE 2/5. As supplied to Acorn.

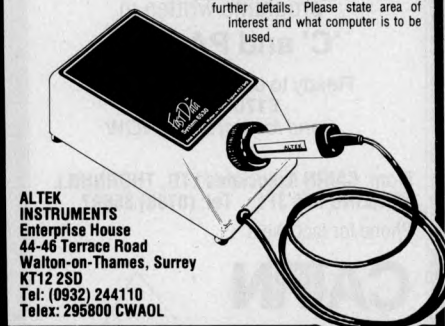
£249.00 + VAT

CBM/PET & APPLE 2

Lowest cost system. Disk based software decodes the bar code format of your choice and is easily interfaced to BASIC or Assembler. A full specification bar code identification system as used by many private and public sector laboratories, industrial and commercial organisations.

£199.00 + VAT

(Not suitable for Apple running CP/M... Use RS232 system!) Phone or write for further details. Please state area of interest and what computer is to be used.



**ATEK
INSTRUMENTS**
Enterprise House
44-46 Terrace Road
Walton-on-Thames, Surrey
KT12 2SD
Tel: (0932) 244110
Telex: 295800 CWAOL

COMPUTER BOOKS MAIL ORDER

Quick delivery, lots of new titles

FREE send for our
comprehensive list of computer
books and software.

**Rickmansworth 779129
(24 hours)**

Or write:

**Computer Books Ltd.
Freepost
Rickmansworth
Herts. WD3 6FP**

Telephone orders ring Eileen or Josie

Rickmansworth (0923) 777652

We aim to please so send off now

```

5020 REM THE STANDARD ONES FOR EACH
5040 REM COLOUR I.E.
5060 REM      0=BLACK    1=WHITE
5080 REM      2=RED      ETC
5100 REM IF A NUMBER HIGHER THAN 15 IS
5120 REM IS USED, ONLY THE LOWER NIBBLE
5140 REM WILL COUNT. THIS COMMAND IS
5160 REM THE EQUIVALENT OF
5180 REM      POKE 53281,X
5200 REM EG      10PAPER 0:CLS
5220 REM
5240 DATA 20,BA,AD,20,F7,B7,A5,14
5260 DATA 8D,21,D0,60
5340 DATA ZZ
5350 REM
5400 DATA 9120, EDGE
5420 REM *****
5440 REM *      EDGE      *
5460 REM *****
5480 REM CHANGES THE COLOUR OF THE
5500 REM BORDER OF THE SCREEN ('EDGE').
5520 REM IT REQUIRES ONE PARAMETER, AND
5540 REM THE COMMAND TAKES THE FORM:
5560 REM      EDGE X
5580 REM WHERE X IS ANY INTEGER IN THE
5600 REM RANGE 0 TO 15. THE NUMBERS ARE
5620 REM THE STANDARD ONES FOR EACH
5640 REM COLOUR I.E.
5660 REM      0=BLACK    1=WHITE
5680 REM      2=RED      ETC
5700 REM IF A NUMBER HIGHER THAN 15 IS
5720 REM IS USED, ONLY THE LOWER NIBBLE
5740 REM WILL COUNT. THIS COMMAND IS
5760 REM THE EQUIVALENT OF
5780 REM      POKE 53280,X
5790 REM 'EDGE' IS OFTEN USED WITH THE
5795 REM 'PAPER' COMMAND E.G.
5800 REM      10 PAPER 0:EDGE 0:CLS
5820 REM
5840 DATA 20,BA,AD,20,F7,B7,A5,14
5860 DATA BD,20,D0,60
5940 DATA ZZ
5980 REM
6000 DATA 9130, AT
6020 REM *****
6040 REM *      AT      *
6060 REM *****
6080 REM USED WITH THE PRINT OR INPUT
6100 REM STATEMENT TO FORMAT THE SCREEN
6120 REM IT REQUIRES TWO PARAMETERS AND
6140 REM THE COMMAND TAKES THE FORM:
6160 REM      AT X,Y
6180 REM WHERE X IS THE X COORDINATE OF
6200 REM THE SCREEN (0 TO 39), AND Y IS
6220 REM THE Y COORDINATE (0 TO 24).THE
6240 REM POINT 0,0 IS IN THE TOP LEFT
6260 REM HAND CORNER.NOTE : NO CHECK IS
6280 REM THAT X' AND Y ARE IN RANGE.
6300 REM WITH 'AT', FEW CURSOR CONTROLS
6320 REM WITHIN PRINT STATEMENTS NEED
6340 REM BE USED. E.G.
6360 REM      10 CLS
6380 REM      20 AT 15,2:PRINT'DEMO'
6390 REM      30 AT 10,5:INPUT A$
6395 REM
6400 DATA 20,BA,AD,20,F7,B7,9B,4B
6420 DATA 20,FD,AE,20,BA,AD,20,F7
6440 DATA B7,A6,14,68,A8,18,20,F0
6460 DATA FF,60
6660 DATA ZZ
6670 REM
6700 DATA 9150, JUMP
6720 REM *****
6740 REM *      JUMP      *
6760 REM *****
6780 REM A CALCULATED 'GOTO'. I.E. A
6800 REM VARIABLE OR EXPRESSION CAN BE
6820 REM USED FOR THE LINE TO BE JUMPED
6840 REM TO. IN NORMAL CBM BASIC
6860 REM      10 GOTO X
6880 REM WILL GIVE AN ERROR. BUT 'JUMP'
6900 REM ACCEPTS ANY EXPRESSION AS A
6920 REM PARAMETER. E.G
6940 REM      10 X=25
6960 REM      20 JUMP X*2
6980 REM WILL GOTO ('JUMP') LINE 50.
6990 REM
7000 DATA 20,BA,AD,20,F7,B7,4C,A3
7020 DATA AB
7060 DATA ZZ
7090 REM
7100 DATA 9160, KEY
7120 REM *****
7140 REM *      KEY      *
7160 REM *****
7180 REM WAITS FOR A KEY TO BE PRESSED.
7200 REM IT DISABLES THE 'RUN STOP' KEY
7220 REM & EMPTIES THE KEYBOARD BUFFER.
7240 REM IT WILL NOT ACCEPT 'SHIFT' AND

```


MICROMART

Now BASIC can do more . . .

fast data handling
key record access
efficient file use

it only has to

CALL MULTIKEY

MULTIKEY works with Compiled and Interpreted Basic.

MULTIKEY accesses records by full, partial or combined keys.

MULTIKEY can handle multiple index files and join data files.

MULTIKEY uses 'B'-tree indexing for power with flexibility.

MULTIKEY is easily maintained, robust and adaptable.

Price £90 includes routines for card index, file maintenance and bulk data entry.

Fact Sheet from Cairn Associates Ltd, Thornhill, Stirling FK8 3PL. Tel: (0786) 85697

CAIRN

STOP PRESS!

MULTIKEY is now available to
give record access by key for
programs written in
'C' and PASCAL

Ready to use library routines
£170 + VAT
Send for fact sheet NOW

From: **CAIRN Associates LTD, THORNHILL**
STIRLING FK8 3PL Tel: (0786) 85697

Phone for fact sheet

CAIRN

BEST PRICES BEST SERVICE

Micros, disk drives, printers,
monitors

Printers

Smith Corona TPI	£200
Daisy Step 2000	£239
Oki M82A	£289
Canon PW1080A	£338
Epson RX80	£235
Canon PW1156A	£425

All prices include VAT and carriage

TSS SALES

4 Falkland Drive
Kings Teignton
Newton Abbot
TQ12 3RH

Tel: Newton Abbot (0626) 64544

PROGRAM FILE

```

7260 REM 'CBM' ETC KEYS AS VALID. E.G.
7280 REM 10PRINT'HIT A KEY TO CONTINUE'
7300 REM 20KEY
7320 REM TO FIND WHICH KEY WAS PRESSED,
7340 REM FOLLOW 'KEY' WITH A 'GET' E.G.
7360 REM 10 KEY:GET A$
7390 REM
7400 DATA A9,00,8D,C6,00,A5,C5,C9
7420 DATA 40,F0,FA,60
7480 DATA ZZ
7490 REM
7500 DATA 9170, YNKEY
7520 REM *****
7540 REM * YNKEY *
7560 REM *****
7580 REM SIMILAR TO 'KEY' BUT WILL WAIT
7600 REM UNTIL THE 'Y' OR THE 'N' KEY
7620 REM IS PRESSED. IDEAL FOR A PROMPT
7640 REM WHICH REQUIRES ONLY A YES OR
7660 REM NO ANSWER. USE THE 'GET' TO
7680 REM FIND WHICH KEY IT WAS. E.G.
7700 REM 10 PRINT'PLAY AGAIN (Y/N)?'
7720 REM 20 YNKEY: GET A$
7740 REM 30 IF A$='N' THEN END
7760 REM 40 REM PLAY GAME AGAIN
7790 REM
7800 DATA A9,00,85,C6,A5,C5,C9,40
7820 DATA F0,FA,C9,27,F0,07,C9,19
7840 DATA F0,03,4C,74,91,60
7970 DATA ZZ
7980 REM
8000 DATA 9190, PAUSE
8020 REM *****
8040 REM * PAUSE *
8060 REM *****
8080 REM WAITS ('PAUSES') FOR A SET
8100 REM TIME. THIS DELAY IS THE VALUE
8120 REM OF THE EXPRESSION IN SECONDS.
8140 REM THUS IT REQUIRES ONLY ONE
8160 REM PARAMETER. E.G.
8180 REM 10 PAUSE 5
8200 REM WAITS FOR FIVE SECONDS BEFORE
8220 REM THE PROGRAM CONTINUES. THE
8240 REM EXPRESSION IS EVALUATED AS AN
8260 REM INTEGER. NOTE : THE 'RUN STOP'
8280 REM KEY IS DISABLED AND THE VALUE
8300 REM OF TI AND TI$ WILL BE ALTERED.
8320 REM
8340 DATA 20,8A,AD,20,F7,B7,A5,14
8360 DATA F0,0E,A9,00,85,A2,A5,A2
8380 DATA C9,3C,D0,FA,C6,14,D0,F2
8400 DATA 60
8550 DATA ZZ
8560 REM
8600 DATA 91B0, EXIT
8620 REM *****
8640 REM * EXIT *
8660 REM *****
8680 REM SWITCHES OFF SCROFF'S BASIC.IT
8700 REM REQUIRES NO PARAMETERS, AND IS
8720 REM NORMALLY USED IN DIRECT MODE :
8740 REM E.G. EXIT
8760 REM IF ALTERING SCROFF'S BASIC AT
8780 REM ALL, USE THE 'EXIT' COMMAND.
8800 REM SYS 36882
8820 REM CAN BE USED INSTEAD OF 'EXIT'.
8840 REM
8860 DATA 4C,12,90
8870 DATA ZZ
8880 REM
8900 DATA 91C0, CFILL
8920 REM *****
8940 REM * CFILL *
8960 REM *****
8980 REM COLOUR FILL - FILLS THE COLOUR
9000 REM MATRIX, WHERE THE COLOURS OF
9020 REM EACH SQUARE ARE STORED, WITH
9040 REM THE VALUE OF 'CFILL'S ONLY
9060 REM PARAMETER. THE NORMAL COLOUR
9080 REM CODE APPLIES. E.G
9100 REM 10 CFILL 0
9120 REM WILL CHANGE EVERYTHING PRINTED
9140 REM ON THE SCREEN TO BLACK.
9150 REM
9160 DATA 20,8A,AD,20,F7,B7,A9,00
9170 DATA 85,FB,A9,DB,85,FC,A0,00
9180 DATA A5,14,91,FB,C8,D0,FB,E6
9200 DATA FC,A5,FC,C9,DC,D0,EF,60
9460 DATA ZZ
9480 REM
9500 DATA 91F0, SFILL
9520 REM *****
9540 REM * SFILL *
9560 REM *****
9580 REM SCREEN FILL - FILLS THE SCREEN
9600 REM WITH A PARTICULAR GRAPHIC
9620 REM SYMBOL, DETERMINED BY IT'S
9640 REM PARAMETER, WHICH SHOULD BE IN
9660 REM THE RANGE 0 TO 255.THE CODE IS

```


PROGRAM FILE

MICROMART

```

9680 REM THE 'POKE' CODE I.E.
9700 REM      0=0      1=A      33=1
9720 REM      49=1     58=:     ETC.
9740 REM THE SCREEN *MUST* BE AT 1024!!
9750 REM
9760 DATA 20,8A,AD,20,F7,B7,A9,00
9770 DATA 85,FB,A9,04,85,FC,A0,00
9780 DATA A5,14,91,FB,C8,D0,FB,E6
9800 DATA FC,A5,FC,C9,08,D0,EF,60
9860 DATA ZZ
9880 REM
10000 DATA 9220, REPEAT
10020 REM *****
10040 REM *          REPEAT          *
10060 REM *****
10080 REM PART OF A 'REPEAT'...'UNTIL'
10100 REM LOOP. IT IS AN ALTERNATIVE TO
10120 REM THE 'FOR'...'NEXT' LOOP WHEN
10140 REM THE NUMBER OF TIMES THE LOOP
10160 REM MUST BE REPEATED IS UNKNOWN.
10180 REM IT REQUIRES NO PARAMETERS BUT
10200 REM *MUST* BE THE FIRST COMMAND
10220 REM ON THE LINE.
10240 REM
10260 DATA 68,68,A9,03,20,FB,A3,38
10280 DATA A5,7A,E9,0B,48,A5,7B,E9
10300 DATA 00,48,A5,3A,48,A5,39,48
10320 DATA A9,CC,48,4C,56,90
10340 DATA ZZ
10360 REM
10400 DATA 9250, UNTIL
10420 REM *****
10440 REM *          UNTIL          *
10460 REM *****
10480 REM PART OF A 'REPEAT'...'UNTIL'
10500 REM LOOP. THE FOLLOWING PARAMETER
10520 REM IS EVALUATED. IF FALSE THE
10540 REM PROGRAM FLOW RETURNS TO THE
10560 REM LAST 'REPEAT' COMMAND. IF TRUE
10580 REM THE PROGRAM FLOW IS NOT
10600 REM AFFECTED AND THE PROGRAM
10620 REM CONTINUES AS NORMAL. 'REPEAT'
10640 REM .'UNTIL' LOOPS MAY BE NESTED.
10660 REM AN E.G.
10680 REM      10 A=1
10700 REM      20 REPEAT
10720 REM      30 ::PRINT A:A=A+1
10740 REM      40 UNTIL A=11
10760 REM
10780 DATA 68,68,68,C9,CC,D0,FB,20
10800 DATA 9E,AD,A5,61,F0,07,68,68
10820 DATA 68,68,4C,56,90,68,85,39
10840 DATA 68,85,3A,68,85,7B,68,85
10860 DATA 7A,4C,56,90
10880 DATA ZZ
10890 REM
11000 DATA 9290, FPOP
11020 REM *****
11040 REM *          FPOP          *
11060 REM *****
11080 REM POPS THE LAST 'FOR' LOOP OFF
11100 REM THE STACK. NORMALLY IF THERE
11120 REM IS A JUMP OUT OF A 'FOR'.....
11140 REM ..'NEXT' LOOP, INFORMATION IS
11180 REM LEFT ON THE STACK, AND IF THIS
11200 REM HAPPENS OFTEN, NO ROOM IS LEFT
11220 REM ON THE STACK, SO AN 'OUT OF
11240 REM MEMORY ERROR' OCCURS. CALLING
11260 REM 'FPOP' *IMMEDIATELY* AFTER
11280 REM LEAVING THE LOOP, SOLVES THIS
11300 REM PROBLEM. E.G.
11320 REM      100 FOR T=1 TO 50
11340 REM      110 ::IF X(T)=NM THEN 130
11350 REM      120 NEXT T
11360 REM      130 FPOP
11380 REM      140 REST OF PROGRAM
11400 REM
11420 DATA 68,68,68,C9,81,D0,FB,A2
11440 DATA 11,68,CA,D0,FC,4C,56,90
11460 DATA ZZ
11480 REM
11500 DATA 92B0, GPOP
11520 REM *****
11540 REM *          GPOP          *
11560 REM *****
11580 REM POPS THE LAST 'GOSUB' OFF THE
11600 REM STACK. SEE 'FPOP' FOR SIMILAR
11620 REM PROBLEMS WITH STACK. USED IF
11640 REM YOU DON'T WISH TO RETURN FROM
11660 REM A GOSUB. DO NOT USE IN THE
11680 REM MIDDLE OF A 'FOR'..'NEXT' LOOP
11700 REM OR A 'REPEAT'...'UNTIL' LOOP.
11720 REM
11740 DATA 68,68,68,C9,8D,D0,FB,A2
11760 DATA 06,68,CA,D0,FC,4C,56,90
11780 DATA ZZ
11790 REM
11800 DATA 92D0, RVS
11820 REM *****
11840 REM *          RVS          *

```

THE C LANGUAGE

This month a new professional version of Aztec C86, and a promising newcomer, Wizard C.

C COMPILERS

8-bit	Aztec C II v1.06D	£155
	Aztec C65 v1.05C	£155
	BDS C v1.50a	£110
	C/80 v3.1	£ 45
	Eco-C v3.1	£185
	Q/C v3.2b	£ 80
16-bit	Aztec C86 v1.06D	£185
	Aztec C86/PRO v3.2	£370
	CI Optimizing C86 v2.2	£345
	C-Systems C v2.0	£210
	De Smet C88 v2.4	£135
	Digital Research C 1.1	£265
	Instant-C v1.01	£425
	Lattice C v2.14	£450
	Mark Williams MWC86 2.0	£450
	Microsoft C v2.03	£450
	RUN/C v1.1	£145
	Wizard C	£425

C LIBRARIES

Data base	Phact	£250
	db-vista	£445
	C-tree	£355
	Btrieve	£245
	C-to-dBase, source	£150
	V-File	£295
	ICS Generic BTREE,s'ce	£295
Graphics	Halo	£185
	C Tools, source	£110
Screen	Panel	£245
Misc	C Helper, source	£135
	Basic C,basic functs	£175
	C Refiner,bas features	£145
	C Food Smorgasbord	£140
	Greenleaf, source	£175

Prices include delivery, but not VAT.
For more information call us.

GREY MATTER

MICRO-COMPUTER INSURANCE

★ All Risks Cover (incl. Transit)
— up to £10,000 for £20

★ Increased Cost of Working – to reinstate lost data

★ Breakdown & Derangement – alternative to maintenance agreement

Comprehensive cover at a reasonable premium:-

Talk to us before taking a Maintenance Contract

Write with details of equipment and value to:-

Geoffrey Hoodless & Associates
Insurance Consultants
Freeport (no stamp required)
Woking, Surrey GU21 4BR

Tel: Woking (04862) 61082 Answering Service.

BEST PRICES

Including FREE packing & postage

Example	RRP	OUR PRICE
Lotus 1-2-3	375.00	285.00
dBase II	365.00	230.00
Symphony	550.00	395.00
WordStar	295.00	195.00
Open Access	450.00	305.00
Multi-Mate	345.00	230.00
Framework	495.00	320.00
Friday	195.00	135.00
dBase III	495.00	330.00
Cardbox	155.00	120.00
Other Software	Phone For Best Prices	
Apricot Micros	Phone For Best Prices	

When ordering, please add 15% VAT to cheque.

For software, state machine and operating system.

PEGASUS ACCOUNTING SOFTWARE

We have fully trained staff who implement Pegasus software in the Midlands at the most competitive prices. Phone for details of our special offer.

AC COMPUTERS LTD.

4A HEARSALL LANE, COVENTRY

Telephone: (0203) 78003 ext. 301

New Brain



NEW BRAIN MODEL AD

★ **Special Purchase** ★
ONLY £149.95

FEATURES: 80 columns ● 4 character sets ●
2 cassette ports ● communications and RS
232 port ● built-in display ● 32K ●
expansion port etc.

Just arrived and now in stock:-

- Disk Controller £139
- Expansion Interface 96k £229
- Disk Drives. Full range from £145
- Large and small Power Supply Units
- Eprom boxes £49.50
- Special matched housing unit holds New Brain, disk controller and expansion interfaces, enhances the look of the whole system.
- Specially chosen tape recorder for the New Brain, superbly reliable £24.75
- CP/M manual including licence £39.50
- Software manual now available £39.25

**WE STOCK A LARGE RANGE OF
CP/M AND CASSETTE-BASED
NEW BRAIN PROGRAMS,
INCLUDING:-**

- ★ Financial spreadsheet
 - ★ Database
 - ★ Word Processing
- AND MANY MORE**

**Send large SAE for the full price list.
Please add VAT to the above prices**

ELSTREE COMPUTER CENTRE

**Elstree Aerodrome, Elstree, Herts
WD6 3AW**

Tel: 01-953 9021



PROGRAM FILE

```

11860 REM *****
11880 REM REVERSES THE FIELD OF EVERY
11900 REM CHARACTER ON THE SCREEN. I.E.
11920 REM NORMAL GOES TO REVERSE FIELD,
11940 REM AND REVERSE GOES TO NORMAL.!!
11960 REM REQUIRES NO PARAMETERS. E.G.
11980 REM      10 RVS
12000 REM SCREEN *MUST* BE AT 1024!!
12020 REM
12040 DATA A9,00,85,FB,A9,04,85,FC
12060 DATA A0,00,B1,FB,49,80,91,FB
12080 DATA C8,D0,F7,E6,FC,A5,FC,C9
12100 DATA 08,D0,ED,60
12120 DATA ZZ
12140 REM
12200 DATA 9300, VOL
12220 REM *****
12240 REM *      VOL      *
12260 REM *****
12280 REM REQUIRES ONE PARAMETER - THE
12300 REM VOLUME FOR ALL THREE VOICES
12320 REM OF THE SID CHIP. IF NOT USING
12340 REM FILTERS, PARAMETER SHOULD BE
12360 REM IN RANGE 0(OFF) TO 15(MAX).EG
12380 REM      10 VOL 15
12400 REM IF USING FILTERS SEE SECTION
12420 REM ON FILTERS, AND ADD FOLLOWING
12440 REM VALUES TO VOL:
12460 REM      +16 LOW-PASS FILTER ON
12480 REM      +32 BANDPASS FILTER ON
12500 REM      +64 HIGH-PASS FILTER ON
12520 REM      +128 VOICE 3 DISCONNECTED
12540 REM      +80 NOICH FILTER ON
12560 REM E.G.      10 VOL 15+16
12580 REM IS VOL 15 AND LOW-PASS FILTER
12600 REM
12620 DATA 20,BA,AD,20,F7,B7,A5,14
12640 DATA 8D,1B,D4,60
12660 DATA ZZ
12680 REM
12700 DATA 9320, VX
12720 REM *****
12740 REM *      VX      *
12760 REM *****
12780 REM REQUIRES ONE PARAMETER - THE
12800 REM VOICE FOR THE OTHER MUSIC
12820 REM COMMANDS.I.E. 'ENVEL','MUSIC'
12840 REM 'PULSE' & 'PLAY'.THESE ACT ON
12860 REM THE MOST RECENT VOICE DEFINED
12880 REM WITH THE 'VX' COMMAND. USE A
12900 REM LOOP FOR DEFINING ETC ALL THE
12920 REM VOICES. E.G.
12940 REM      10 FOR I=1 TO 3: VX I
12960 REM      20 REM OTHER MUSIC COMMANDS
12980 REM      30 NEXT I
12990 REM THE MOST RECENT 'VX' IS THE
12995 REM CURRENT VOICE DEFINED.
13000 REM
13020 DATA 20,BA,AD,20,F7,B7,A9,00
13040 DATA 8D,B0,02,A5,14,C9,02,D0
13060 DATA 06,A9,07,8D,B0,02,60,C9
13080 DATA 03,D0,05,A9,0E,8D,B0,02
13090 DATA 60
13100 DATA ZZ
13120 REM
13200 DATA 9350, ENVEL
13220 REM *****
13240 REM *      ENVEL      *
13260 REM *****
13280 REM REQUIRES FOUR PARAMETERS-THE
13300 REM ATTACK,DECAY,SUSTAIN, RELEASE
13320 REM IN THE RANGE 0 TO 15 (MAX),
13340 REM FOR THE LAST DEFINED 'VX'. EG
13360 REM      10 VX 1
13380 REM      20 ENVEL 0,7,4,2
13400 REM DEFINES THE WAVEFORM OF VOICE
13420 REM ONE (A=0, D=7, S=4, R=2).
13430 REM
13440 DATA 20,BA,AD,20,F7,B7,A5,14
13460 DATA 0A,0A,0A,0A,BD,A7,02,20
13480 DATA FD,AE,20,BA,AD,20,F7::
13500 DATA B7,A5,14,29,0F,0D,A7,02
13520 DATA AC,B0,02,C8,C8,C8,C8,C8
13540 DATA 99,00,D4,C8,BC,AB,02,20
13560 DATA FD,AE,20,BA,AD,20,F7,B7
13580 DATA A5,14,0A,0A,0A,0A,BD,A7
13600 DATA 02,20,FD,AE,20,BA,AD,20
13620 DATA F7,B7,A5,14,29,0F,0D,A7
13640 DATA 02,AC,AB,02,99,00,D4,60
13660 DATA ZZ
13680 REM
13700 DATA 93B0, MUSIC
13720 REM *****
13740 REM *      MUSIC      *
13760 REM *****
13780 REM REQUIRES ONE PARAMETER - THE
13800 REM FREQUENCY ( OR NOTE ) FOR THE
13820 REM LAST 'VX' TO BE PLAYED. MUST
13840 REM BE IN RANGE 0 TO 65535. E.G.

```


PROGRAM FILE

MICROMART

```

13860 REM      10 MUSIC 4000
13880 REM
13900 DATA 20,BA,AD,20,F7,B7,AC,B0
13920 DATA 02,A5,14,99,00,D4,CB,A5
13940 DATA 15,99,00,D4,60
13960 DATA ZZ
13980 REM
14000 DATA 93D0, PULSE
14020 REM *****
14040 REM *      PULSE      *
14060 REM *****
14080 REM REQUIRES ONE PARAMETER - THE
14100 REM WIDTH OF THE PULSE, *IF* A
14120 REM SQUARE WAVE IS TO BE SELECTED
14130 REM (OF MOST RECENT 'VX' COMMAND)
14140 REM MUST BE IN RANGE 0 TO 4095
14160 REM (0 OR 4095 PRODUCE CONSTANT
14180 REM OUTPUT, 2048 PRODUCES A SQUARE
14200 REM WAVE.) E.G.
14220 REM      20 PULSE 2000
14240 REM
14260 DATA 20,BA,AD,20,F7,B7,AC,B0
14280 DATA 02,CB,CB,A5,14,99,00,D4
14300 DATA CB,A5,15,99,00,D4,60
14320 DATA ZZ
14360 REM
14400 DATA 93F0, PLAY
14420 REM *****
14440 REM *      PLAY      *
14460 REM *****
14480 REM REQUIRES ONE PARAMETER - THE
14500 REM WAVE FORM OF THE CURRENT 'VX'
14520 REM      129 NOISE
14530 REM      65 PULSE
14540 REM      33 TRIANGLE
14560 REM      17 SAW TOOTH
14580 REM SHOULD 'PLAY 0' BEFORE THE
14600 REM NEW 'PLAY' COMMAND. 'PLAY' POKES
14620 REM INTO THE CONTROL REG. FOR THE
14640 REM CURRENT VOICE, SO OTHER VALUES
14660 REM CAN BE USED FOR RING MOD ETC.
14680 REM TO PLAY A COMPLETE VOICE :
14700 REM      10 VOL 15:VX 1
14720 REM      20 ENVEL 2,10,2,0
14740 REM      30 MUSIC 4000
14760 REM      40 PLAY 0:PLAY 17
14780 REM
14800 DATA 20,BA,AD,20,F7,B7,AC,B0
14820 DATA 02,CB,CB,CB,CB,A5,14,99
14840 DATA 00,D4,60
14860 DATA ZZ
14880 REM
15000 DATA 9410, FILTFQ
15020 REM *****
15040 REM *      FILTFQ      *
15060 REM *****
15080 REM REQUIRES ONE PARAMETER - THE
15100 REM CUTOFF FREQUENCY OF THE
15120 REM FILTER (SEE 'VOL' & 'FILTER')
15140 REM FREQUENCY IS IN RANGE 0 TO
15160 REM 2048. E.G.
15180 REM      10 FILTFQ 1000
15200 REM
15220 DATA 20,BA,AD,20,F7,B7,A5,14
15240 DATA 8D,15,D4,4A,4A,4A,85,14
15260 DATA A5,15,0A,0A,0A,05,14,8D
15280 DATA 16,D4,60
15300 DATA ZZ
15320 REM
15400 DATA 9440, FILTER
15420 REM *****
15440 REM *      FILTER      *
15460 REM *****
15480 REM REQUIRES ONE PARAMETER - THE
15500 REM FILTERS TO SWITCH ON OR OFF.
15520 REM E.G. 1 FILTER 1 ON
15540 REM      2 FILTER 2 ON
15550 REM      4 FILTER 3 ON
15560 REM      7 ALL FILTERS ON
15570 REM      0 ALL FILTERS OFF
15580 REM OR COMBINATIONS. THE TOP FOUR
15600 REM BITS CONTROL THE RESONANCE OF
15620 REM THE FILTER.
15640 REM
15660 DATA 20,BA,AD,20,F7,B7,A5,14
15680 DATA 8D,17,D4,60
15700 DATA ZZ
15720 REM
16000 DATA 9460, SPRITE
16020 REM *****
16040 REM *      SPRITE      *
16060 REM *****
16080 REM REQUIRES ONE PARAMETER - THE
16100 REM CURRENT SPRITE ON WHICH THE
16120 REM OTHER SPRITE COMMANDS ACT IE:
16140 REM 'COLSP', 'XSP' & 'YSP'. USE A
16160 REM LOOP TO DESIGNATE EACH SPRITE
16180 REM IN TURN. E.G.
16200 REM      10 FOR T=0 TO 7

```

PROLOG & LISP

We believe we have the widest range of high level declarative languages in Europe and will be happy to advise on your choice.

PROLOG INTERPRETERS

<u>8-bit</u>	micro-PROLOG	£ 75
	PROLOG-1	£225
<u>16-bit</u>	PROLOG-86	£125
	micro-PROLOG	£180
	PROLOG-1	£299
	IF/PROLOG	£599

LISP INTERPRETERS

<u>8-bit</u>	Toolworks LISP/80	£ 40
	iLisp	£ 60
	Waltz Lisp	£155
	mLisp-80	£170
<u>16-bit</u>	Toolworks LISP/86	£ 40
	BYSO LISP	£ 90
	IQ Lisp	£165
	mLisp-86	£199
	Gold Common Lisp	£465

VERY HIGH LEVEL LANGUAGES

<u>8-bit</u>	mMath/muSimp	£225
<u>16-bit</u>	mMath/muSimp	£250
	Q'Nial (IBM PC)	£345
	SNOBOL4+	£ 85

EXPERT SYSTEM SHELLS

Micro Expert	£500
APES	£240
ES/P ADVISOR	£600

Prices include delivery, but not VAT.
For more information call us.

GREY MATTER

INVESTORS!

Track your shares' progress with **STOCKMARKET MANAGER**, the definitive investment program for the **SINCLAIR QL**

- Simple entry of data on purchases, sales, prices etc.
- Portfolio variation — analysed by investment type — comparison of performance against market.
- Calculation of % return on each investment.
- Assessment of Capital Gains Tax liability.
- Handles all investment types incl. Traded Options.
- Prints output to QL compatible printer.

Written by a professional investment manager, it integrates with ARCHIVE and makes full use of menus and prompts.

Available now on microdrive, complete with comprehensive manual.

Order From: **PORTFOLIO SOFTWARE**
PO BOX NO 15, LONDON SW11 5RP

Please send: _____ Number of copies

"STOCKMARKET MANAGER" programme @ £39.95, ☐
incl P&P

Information Sheet (please enclose SAE) ☐
I enclose cheque/PO payable to PORTFOLIO SOFTWARE,

for £.....

Name.....

Address.....

.....PCW 3/85

STOCK MARKET MANAGER from **Portfolio Software**

FORTH = TOTAL CONTROL QL FORTH — AVAILABLE NOW

FORTH 83 from Laboratory Microsystems — the professional FORTHS complete with full-screen editor, macro-assembler, multi-tasking, turn-key compiler, decompiler, binary overlays, file maintenance and system utilities, example programs, and extensive documentation. These FORTHS are available for Z80, 8086/88, and 68000 processors. State disc format with order. A special integrated version is available for IBM PCs and 100% compatibles. CPM-80 £95+VAT, CPM-86, MS/PCDOS £120+VAT, CPM-68K £190+VAT.

Cross-compilers — transport FORTH to different processors, generate ROMmable code, as used to write QL FORTH. The complete micro-processor development system — from £225. Choose targets from — 6502, 6511Q, 8080, 8086/88, Z80, 6800, 6301/6801, 6809, 68000, 1802, Z8, 8070, 99xxx, Z8000, LSI-11 — from £95+VAT.

QL FORTH-83 — screen editor, macro-assembler, decompiler, turnkey compiler, binary overlays, floating point, colour, graphics, sound, 'hash cache' fast compiler, and 70 page manual — £29.95.

NEUBRAIN FORTH in PROM — includes screen editor, full integration to NEUBRAIN i/o handlers, complete Z80 macro-assembler, floating point, graphics, decompiler, utilities, and manual — £51.75.

Dragon cartridge — split screen editor, sound colour, decompiler, overlays, joystick and timer support, full documentation, and complete source code — £35, CoCo version £45.

Do-it-yourself FORTH kits Installation manual — How to do it, model, definitions, editor £7. Source code listings:— 6502, 6800, 6809, 8080, Z80, 8086/8088, 9995, 1802, 68000, Z8000, VAX, Apple, LSI-11 — £7 each.

Comprehensive range of FORTH books includes —

'Starting FORTH' by Brodie — classic..... £20.45
'Thinking FORTH' by Brodie — excellent £15.45
'Threaded Interpretive Languages'..... £20.75
'Systems Guide to fig-FORTH' by Ting..... £22
'FORTH Programming' by Scanlon..... £13.50



MicroProcessor Engineering Ltd
21 Hanley Road Shirley
Southampton SO1 5AP
Tel: 0703 780084

SHARP MZ-80A ACCELERATOR

- ★ Increases CPU and tape speed by over 60%!
- ★ Faster loading and saving of your programs!
- ★ Fitted in minutes! Simply plugs in!
- ★ No soldering or track cutting involved!
- ★ Speed selectable at the touch of a switch!
- ★ Comprehensive manual with easy to follow installation instructions.
- ★ Adds new skill levels to your games!
- ★ Complete package includes utility to convert your tapes from lo to hi speed versions.

ONLY £22.95

Post and packing £1.50

Cheques and POs payable to:

SharpSpeed Products
PO Box 62 STAFFORD
STAFFS ST20 0RL
SAE with all Enquiries please

PROGRAM FILE

```

16220 REM      20 SPRITE T:COLSP 1
16240 REM      30 NEXT T
16260 REM SPRITES ARE NUMBERED 0 TO 7.
16280 REM
16300 DATA 20,BA,AD,20,F7,B7,A5,14
16320 DATA 29,07,BD,B2,02,60
16340 DATA ZZ
16360 REM
16400 DATA 94B0, MUBCTRL
16420 REM *****
16440 REM *      MUBCTRL      *
16460 REM *****
16480 REM REQUIRES ONE PARAMETER - THE
16500 REM SPRITES THAT ARE TO BE TURNED
16520 REM UN. 'MUBCTRL' IS INDEPENDANT
16540 REM OF THE 'SPRITE' COMMAND. E.G.
16560 REM      0  ALL SPRITES OFF
16580 REM      255 ALL SPRITES ON
16600 REM      1  SPRITE 0 ON
16620 REM      2  SPRITE 1 ON
16640 REM      4  SPRITE 2 ON  ETC.
16680 REM
16700 DATA 20,BA,AD,20,F7,B7,A5,14
16720 DATA 8D,15,D0,60
16740 DATA ZZ
16760 REM
16800 DATA 9490, COLSP
16820 REM *****
16840 REM *      COLSP      *
16860 REM *****
16880 REM REQUIRES ONE PARAMETER - THE
16900 REM COLOUR ( 0 TO 15 ) OF THE
16920 REM CURRENT SPRITE. SEE 'SPRITE'
16940 REM FOR AN EXAMPLE.
16960 REM
17000 DATA 20,BA,AD,20,F7,B7,A5,14
17020 DATA AC,B2,02,99,27,D0,60
17040 DATA ZZ
17060 REM
17100 DATA 94B0, XSP
17120 REM *****
17140 REM *      XSP      *
17160 REM *****
17180 REM REQUIRES ONE PARAMETER - THE
17200 REM X COORDINATE OF THE CURRENT
17220 REM SPRITE. IT MUST BE BETWEEN
17240 REM 0 AND 511. ( ALTHOUGH NOT ALL
17260 REM WILL BE ON THE SCREEN ). SEE
17280 REM 'YSP' FOR AN EXAMPLE.
17300 REM
17320 DATA 20,BA,AD,20,F7,B7,A9,00
17340 DATA AC,B2,02,F0,07,18,69,02
17360 DATA 8B,4C,BB,94,AB,A5,14,99
17380 DATA 00,D0,A5,15,29,01,85,15
17400 DATA AC,B2,02,CB,B9,F4,94,85
17420 DATA 14,AD,10,D0,25,14,BD,10
17440 DATA D0,A5,15,D0,01,60,B9,FD
17460 DATA 94,85,14,AD,10,D0,05,14
17480 DATA 8D,10,D0,60,EA,FE,FD::
17500 DATA FB,F7,EF,DF,BF,7F,EA,01
17520 DATA 02,04,0B,10,20,40,B0
17540 DATA ZZ
17560 REM
17600 DATA 9510, YSP
17620 REM *****
17640 REM *      YSP      *
17660 REM *****
17680 REM REQUIRES ONE PARAMETER - THE
17700 REM Y COORDINATE OF THE CURRENT
17720 REM SPRITE. IT MUST BE BETWEEN
17740 REM 0 AND 255. ( ALTHOUGH NOT ALL
17760 REM WILL BE ON THE SCREEN ). EG
17780 REM      10 SPRITE 0:COLSP 0
17800 REM      20 XSP 300:YSP 100
17820 REM
17840 DATA 20,BA,AD,20,F7,B7,A9,01
17860 DATA AC,B2,02,F0,07,18,69,02
17880 DATA 8B,4C,1B,95,AB,A5,14,99
17900 DATA 00,D0,60
17920 DATA ZZ
17940 REM
50000 DATA ZZZZ:REM END OF PROGRAM DATA MARKER

READY.

```



BBC/Electron Dizzy Dots

by R N Arrowsmith

Dizzy Dots for the BBC Models A and B and the Acorn Electron is a computer version of a game I, for one, used to play at school. Given a square of dots, each player takes turns to try and form squares by

PROGRAM FILE

joining adjacent dots. If a player forms a square he gets one point and another turn. The game will cope with up to five players and one computer opponent — I've yet to beat the computer opponent!

>LIST

```
10REM*****
20REM*
30REM* D I Z Z Y D O T S *
40REM*
50REM* R.N.Arrowsmith 1984 *
60REM*
70REM* FOR BBC Micro or *
80REM* Acorn Electron *
90REM*
100REM*****
110*KEY10"OLDIMRUNIM"
120*FX200,1
130MODE1:PROCinstruct
140REPEAT
150PROCsetup
160PROCstartgame
170REPEATPROCmove
180UNTILboxesleft%=0
190PROCendgame:UNTILFALSE
200END
210:
220DEFPROCinstruct
230PROCtitle
240PRINTTAB(0,7)" Each player takes to
rns to join the""dots to form squares."
"" Whenever a player completes a square
""they get one point and another turn."
250PRINT"" You can play against the co
mputer, or""just use the computer as a
playing""board."
260maxx%=9:maxy%=9:maxplayer%=6
270DIMdots%(maxx%,maxy%),boxs%(maxx%-1
,maxy%-1),player$(maxplayer%),score%(max
player%)
280DIMcol1%(maxplayer%),col2%(maxplaye
r%)
290FORA%=0TOMaxplayer%-1:READcol1%(A%)
,col2%(A%):NEXT
300DATA1,1,2,2,3,3,1,2,1,3,2,3
310VDU4
320ENVELOPE1,4,20,-15,-15,6,3,3,127,33
,-4,-10,126,126
330ENVELOPE2,4,-10,-2,0,3,0,0,127,100,
-1,-10,120,122
340ENVELOPE3,1,4,8,4,30,30,5,5,5,-10,-
30,126,10
350COLOUR2
360PRINT""DO YOU WANT THE NOISES? (Y/N
)"
370REPEATA=GET OR32:UNTILA=121 OR A=11
0
380IFA=110THEN*FX210,1
390IFA=121THEN*FX210,0
400COLOUR1
410PRINTTAB(10,20)"PRESS THE SPACE BAR
";REPEATUNTILGET=32
420ENDPROC
430:
440DEFPROCsetup
450FORX%=0TOMaxx%:FORY%=0TOMaxy%:dots%
(X%,Y%)=0:IFX%<maxx% ANDY%<maxy% boxs%(X
```

MICROMART

DISK COPYING SERVICE

Moving data and program files from one machine to another is often made difficult because different manufacturers have adopted different disk format standards.

We can copy your files to and from over 350 disk formats including CP/M, CP/M-86, MS-DOS, PC-DOS, ISIS, APPLE, SIRIUS, TORCH, APRICOT, HP150, TRSDOS, DEC RT-11, and IBM REF.

Disks are normally despatched on the day they are received.

Our charge is £10.00 + disk + VAT. Special prices for quantities.

For more information call us.

GREY MATTER

MICRO ARTS — THE ONLY ONE — Graphics & Music

Micro Arts is a micro computer art forum that publishes a magazine and software. It is aimed at the average user rather than the professional and intends to promote interest in new areas within an increasingly predictable micro market. Topics covered include graphics, music, literature, interactional programs etc.

Anything can happen in the world of Micro Arts!

Free magazine with all software

SOFTWARE: Spectrum 48k, MA1: "Abstract Originals" Eight colourful animations — Full Menu Control, Open Listing — £3.00.

MA2: Various Unusual Events, 6 Tantalising Provocations — incl. Money-work System; Carry on Computing; Dada — £2.50.

BBC MODEL 'B' MA3: Martin Routes — Vol 1; 6 Graphic Animation Programs incl. Mondrian, Pic-swap — £3.00.

MA4: TEXT/LYRIC GENERATOR — Produces text on user defined (Spectrum 48k or BBC Specif) — £2.50.

MAGAZINE: ISSUE ONE: Language — What is Computer Art; Language as Virus; Electric Beowulf; Micro Music; Film and Video; Glossary; Photo Pages; more.

ISSUE TWO: "Sextech" — Sensuality and Technology; Programmer as Onanist; Micro Music; Systems Music; The Random Soul; more. Mags 90p each incl. Postage.

Send stamp for catalogue and details.

**MICRO ARTS (P), PO BOX 587
LONDON SW4 9PH. Tel: 01-720 4456**

SMC VIDEO

5 Hanson Street London W1P 7LJ
Tel: 01-637 3626

SOFTWARE DISCOUNTS SPECIAL OFFERS

D. BASE II	£239
WORDSTAR PROFESSIONAL	£275
LOTUS 1-2-3	£279
SAGE ACCOUNTS	£259

OTHERS	List Price	Our Price
SUPERWRITER	£295	£199
INFORSTAR	£295	£210
SYMPHONY	£550	£420
KNOWLEDGEMAN	£450	£299
MULTIMATE	£350	£245
DRC COMPILE	£275	£215
FRAMEWORK	£495	£345
SUPERCALC II	£195	£145
SUPERCALC III	£295	£210
D. BASE III	£495	£345
FRIDAY!	£195	£139
OPEN ACCESS	£450	£320

All prices exclusive of VAT

Over 400 leading software packages available. Packages available for several computer makes. We are the cheapest in town, ask for our price list.

TRY US AND YOU WILL NEVER WANT TO GO ANYWHERE ELSE!

STOCK CLEARANCE BARGAINS

SIRIUS TWIN FLOPPY (Single-sided) ... £1,536
 SIRIUS TWIN FLOPPY (Double-sided) ... £1,885
 SIRIUS SX (10mb hard disk) ... £2,795
 APRICOT PC TWIN FLOPPY (Single-sided) inc 9" monitor ... £1,345
 APRICOT XI 5mb plus 315k floppy inc 9" monitor ... £1,995
 APRICOT XI 10mb plus 720k floppy inc 9" monitor ... £2,396
 SANYO MBC 555 Twin 160k disks inc green monitor ... £957
 COMPAC TWIN 320k disk inc integral 9" monitor ... £1,750

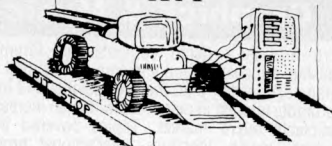
ALL PRICES EXCLUDING VAT
 LOW DELIVERY CHARGES

ALLIANCE COMPUTERS LTD
 BROOKFIELD INDUSTRIAL PARK
 1210 LINCOLN ROAD
 PETERBOROUGH PE4 6LA

Tel: 0733 77100

PERSONAL CALLERS WELCOME

PROGRAM TUNING KIT



to achieve maximum performance!

The Program Tuning Kit produces a listing of the subroutines of your program by percentage CPU utilisation. You can spot the bottlenecks, deal with them and your system will go faster! Suitable for programs written in FORTRAN, C or ASSEMBLER under MSDOS/PCDOS £175 plus VAT

FigureFlow Ltd

9, Market Place, Hadleigh, Suffolk.
 Tel: (0473) 822917

CRASS-80 FOR Z-80 CRASS-65 FOR 6502 CROSS ASSEMBLERS ON THE ACT APRICOT

★ Write Source Text with a professional Word Processor then assemble to MS DOS disk file or direct to target System

★ Only £95 + VAT Delivered
 From: **STEVE BETTS SOFTWARE**

42 WALLACE DRIVE
 EATON BRAY
 BEDS. LU6 2DF

Tel: EATON BRAY (0525) 220922

★ OTHER HOST AND TARGET SYSTEMS UNDER DEVELOPMENT
 ENQUIRE FOR DETAILS

PROGRAM FILE

```
% ,Y%)=0
46ONEXTY%: IFX%<maxplayer%player$(X%)="
":score%(X%)=0
47ONEXTX%
48OVDU2B,0,30,39,6,12
49OVDU19,3,2,0;0;0;
50OCOLOUR3
51OPRINT" Do you want me to play? (Y/N
)":
52OREPEAT=GET OR32:UNTILA=121 OR A=11
0
53OIFA=121PRINT""Oh GOODY! I like thi
s game!":min%=1:max%=maxplayer%-1 ELSEPR
INT""I hope youve got a partner then!":
min%=2:max%=maxplayer%
54OPRINT" How many of you humans are t
here?"
55OPRINT"Only ";min%:" to ";max%:" may
play?";
56OREPEAT=GET-48:UNTILA%>min% AND A
%<=max%
57OVDUA%-48
58OPRINT""OK! Thats ";A%:" human";:IF
A%>1PRINT"s";
59OIFA=121PRINT" and me":A%=A%+1:ELSE
PRINT
60Omax%=A%
61OPRINT
62Omaxx%=(4+max%): IFmaxx%>9THENmaxx%=9
63Omaxy%=maxx%
64OFORB%=OTDAX-1
65OIFB%=A%-1 ANDA=121PRINT"Ok I'll go
last!":player$(B%)="Dizzy":GOTO700
66OPRINT"Enter the name of player ";B%
+1:IFA=121PRINT" or press enter for my t
urn"
67OPRINT":INPUTplayer$(B%)
68OIFplayer$(B%)=""ANDAC<>121THENPRINT"
Don't be daft!":GOTO660
69OIFplayer$(B%)=""THENplayer$(B%)="Di
zzy":A=122
70ONEXT
71OCOLOUR1
72OPRINT""PRESS THE SPACE BAR":REPEAT
UNTILGET=32
73OVDU26
74OENDPROC
75:
76ODEFPROCstartgame
77OCLS:COLOUR1:GCOLO,1
78OFORX%=OTDmaxx%
79OFORY%=OTDmaxy%
80OPROCDOT(X%,Y%):NEXT:NEXT
81OPRINTTAB(3,1);
82OFORX%=1TO10
83OCOLOURX%MOD3+1:PRINT" ";MID$("DIZZ
Y DOTS",X%,1);
84ONEXT
85O@%=0:VDU5
86OX1%=FNxcoord(-1)
87OX2%=FNxcoord(maxx%+1)
88OFORY%=OTDmaxy%:MOVE X1%,FNycoord(Y%
):PRINTY%
89OMOVEX2%,FNycoord(Y%):PRINTY%
90ONEXT
91OY1%=FNycoord(-1)
```


PROGRAM FILE

```

920Y2%=FNycoord(maxy%+1)
930FORX%=0TOmaxx%:MOVEFNxcoord(X%),Y1%
:VDUX%+65
940MOVEFNxcoord(X%),Y2%:VDUX%+65
950NEXT:VDU4
960boxesleft%=maxx%*maxy%
970thisplayer%=0
980ENDPROC
990:
1000DEFFPROCdot(X%,Y%)
1010X%=FNxcoord(X%)
1020Y%=FNycoord(Y%)
1030MOVEX%,Y%:DRAWX%,Y%+4:DRAWX%+8,Y%+4
:DRAWX%+8,Y%
1040ENDPROC
1050:
1060DEFFFNxcoord(X%)=240+X%*80
1070:
1080DEFFFNycoord(Y%)=288+Y%*64
1090:
1100DEFFPROCmove
1110REPEAT
1120PROCgetmove
1130PROCmakemove
1140UNTILNOT scored% ORboxesleft%=0
1150thisplayer%=thisplayer%+1:IFthispla
yer%=max% thisplayer%=0
1160ENDPROC
1170:
1180DEFFPROCgetmove
1190REPEAT
1200IFplayer$(thisplayer%)="Dizzy"PROCm
ymove ELSEPROCtheirmove
1210UNTILFNmoveok
1220ENDPROC
1230:
1240DEFFPROCguessmove
1250X1%=RND(maxx%+1)-1:Y1%=RND(maxy%+1)
-1
1260X2%=X1%:Y2%=Y1%
1270IFRND>.5 THENX2%=X2%+1 ELSEY2%=Y2%+
1
1280ENDPROC
1290:
1300DEFFFNmoveok
1310IFX1%>maxx%ORX2%>maxx%ORY1%>maxy%OR
Y2%>maxy%THENGOTO1400
1320dir1%=0
1330IFABS(X1%-X2%)+ABS(Y1%-Y2%)<>1 THEN
GOTO1400
1340IFX2%-X1%=1 dir1%=1:dir2%=2
1350IFX1%-X2%=1 dir1%=2:dir2%=1
1360IFY2%-Y1%=1 dir1%=4:dir2%=8
1370IFY1%-Y2%=1 dir1%=8:dir2%=4
1380IFdir1%=0 THEN VDU7:=FALSE
1390IF(dots%(X1%,Y1%) ANDdir1%)=0 THEN=
TRUE
1400IFplayer$(thisplayer%)="Dizzy"THEN=
FALSE
1410SOUND&101,2,100,10:SOUND&100,2,100,
10
1420=FALSE
1430:
1440DEFFPROCmakemove
1450SOUND1,1,100,10:SOUND2,1,130,10
1460dots%(X1%,Y1%)=dots%(X1%,Y1%) ORdir

```

MICROMART

PASCAL COMPILERS

We can advise which is the best Pascal for your needs. Our wide range includes the remarkable TURBO Pascal.

8-bit	Nevada Pascal (JRT4)	£ 40
	Turbo Pascal v2.0	£ 49
	Pascal/MT+	£ 99
	Pro Pascal	£199
16-bit	Utah Pascal (JRT)	£ 40
	Turbo Pascal v2.0	£ 49
	MS Pascal	£ 99
	SBB Personal	£115
	Practical Pascal	£145
	Pro Pascal	£290
	SBB Professional	£335
	Pascal/MT+86	£380

Prices include delivery, but not VAT.
For more information call us.

GREY MATTER

NAG

FOR THE

ACT

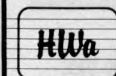
Sirius



The PC50 Library is a subset of the internationally renowned NAG library and offers a powerful set of programming tools for the Fortran user on the Sirius. Can you afford to be without

THE NAG FORTRAN PC50 LIBRARY

For full details write to:—



**HARRISON-WARD
associates Ltd.**

62 LYNTON ROAD, RAYNERS LANE,
HARROW, MIDDLESEX HA2 9NN

★ IBM PC/APRICOT VERSIONS NOW AVAILABLE ★

smARTWORK

Circuit Board Design Without The Tedium

smARTWORK let you create and revise Printed Circuit Board artwork on your IBM PC or compatible £895.00 + VAT.

Complete PCB design starter systems, including SAM computer, FX 100 printer, from £3995.00 + VAT.

★★ SPECIAL OFFER ★★

10% introductory discount for limited period only.

MY WORD

Wordstar compatible editor for the IBM PC. Many additional features including a calculator for an incredible £49.95 + VAT.

CONGUIN SOFTWARE

14 GOODWOOD CLOSE, MORDEN, SURREY SM2 5AW
Tel: 0524 381423 No callers please

BRAIN SURGEONS

Anita Electronic Services (London) Ltd. are specialists in the repair and service of the Superbrain and associated peripherals.

We offer a fast on-site nationwide service or alternative repairs can be carried out at our workshops should you wish to bring your machine in to us.

Maintenance contracts are available at very competitive prices.

We also specialise in the repair of Commodore, Apple, IBM Apricot, Osborne and Sirius.

Trade enquiries welcome

For further information telephone or write to:—

Mr. D. Wilkinson
Anita House,
15 Clerkenwell Close,
London EC1R 0AD
Tel: 01-253 2444

FLOPPY DISK DRIVE HEADS WORN OUT?

No longer do you need to throw them out and buy a new one. We can refurbish most types of disk drive heads (Tandon, BASF, Remex, Siemens, Calcomp and many more).

- All makes of floppy disk drives repaired and aligned (exchange service).
- IBM PCS upgraded from 180-360k disk drives £220 + VAT
- Sirius upgraded 1.2meg-2.4meg disk drives £230 + VAT

COMMONSIDE

64a HIGH STREET
WIMBLEDON VILLAGE, SW19 5EE
Tel: 01-879 3768 Telex: 89 54575 CTC

3 1/2" or 5 1/4" WINCHESTERS

FOR
GEMINI/NASCOM, SUPERBRAIN,
IBM, APRICOT, SIRIUS
AND EPSON COMPUTERS

★ ★ INTRODUCTORY OFFER ★ ★
5 1/4" 10 MB VERSION £999 + VAT

★ OTHER CAPACITIES/SIZES
AVAILABLE

★ FACILITIES FOR MOST
COMPUTERS ON REQUEST
★ 64K PRINTER BUFFER, WITH
PARALLEL SERIAL INTERFACES.
RING FOR DETAILS

TEL (0245) 57575

For further details. Securicor delivery, back up support and HP terms available.

CIRTRIK

29 Beeches Road, Chelmsford, Essex
CM1 2RX
VAT No. 407 0905 74

```

1%
1470dots%(X2%,Y2%)=dots%(X2%,Y2%) ORdir
2%
1480MOVEFNxcoord(X1%),FNycoord(Y1%):600
L1,2:DRAWFNxcoord(X2%),FNycoord(Y2%)
1490score%=FALSE
1500IFdir1%=1:PROCcheckv(X1%,Y1%)
1510IFdir1%=2:PROCcheckv(X2%,Y2%)
1520IFdir1%=4:PROCcheckh(X1%,Y1%)
1530IFdir1%=8:PROCcheckh(X2%,Y2%)
1540ENDPROC
1550:
1560DEFPROCcheckv(X%,Y%)
1570IFY%<maxy%PROCcheckbox(X%,Y%,8)
1580IFY%>OPROCcheckbox(X%,Y%-1,2)
1590ENDPROC
1600:
1610DEFPROCcheckh(X%,Y%)
1620IFX%<maxx%PROCcheckbox(X%,Y%,4)
1630IFX%>OPROCcheckbox(X%-1,Y%,1)
1640ENDPROC
1650:
1660DEFPROCcheckbox(X%,Y%,side%)
1670IFX%<0 OR X%>maxx% OR Y%<0 OR Y%>ma
xy% THENENDPROC
1680boxs%(X%,Y%)=boxs%(X%,Y%)ORside%
1690IFboxs%(X%,Y%)<>15THENENDPROC
1700PROCbox(X%,Y%)
1710score%(thisplayer%)=score%(thisplay
er%)+1
1720boxesleft%=boxesleft%-1
1730score%=TRUE
1740ENDPROC
1750:
1760DEFPROCtheirmove
1770PRINTTAB(0,27);SPC(20);TAB(0,27);"I
t's your move ";player$(thisplayer%)
1780PRINTTAB(0,28);SPC(20);TAB(0,28);
1790REPEATX1%=(GETOR32)-97:UNTILX1%>=0
AND X1%<maxx%+1:VDUX1%+65
1800REPEATY1%=(GETOR16)-48:UNTILY1%>=0
AND Y1%<maxy%+1:VDUY1%+48
1810PRINT" to ";
1820REPEATX2%=(GETOR32)-97:UNTILX2%>=0
AND X2%<maxx%+1:VDUX2%+65
1830REPEATY2%=(GETOR16)-48:UNTILY2%>=0
AND Y2%<maxy%+1:VDUY2%+48
1840ENDPROC
1850:
1860DEFPROCmymove
1870X1%=maxx%+1
1880FDRX%=0TOMaxx%-1:FDRY%=0TOMaxy%-1
1890IFboxs%(X%,Y%)=7 ORboxs%(X%,Y%)=11
ORboxs%(X%,Y%)=13 ORboxs%(X%,Y%)=14 THEN
PROClastside
1900NEXTY%:NEXTX%
1910IFX1%>maxx%THENREPEATPROCguessmove:
UNTILFNmoveok
1920ENDPROC
1930:
1940DEFPROClastside
1950IFboxs%(X%,Y%)=7 ORboxs%(X%,Y%)=11
THEN X1%=X%:Y1%=Y% ELSEX1%=X%+1:Y1%=Y%+1
1960IFboxs%(X%,Y%)=7 ORboxs%(X%,Y%)=14T
HEN X2%=X%+1:Y2%=Y% ELSEX2%=X%:Y2%=Y%+1
1970ENDPROC
    
```


PROGRAM FILE

MICROMART

1980RUN

1990DEFPROCbox (X%, Y%)

2000X%=FNxcoord (X%)+40

2010SOUND3,3,10,10

2020FORy%=FNycoord (Y%) TOFNycoord (Y%+1) -
4STEP4

2030IFy%MDD8=0THENGCOL1,col1%(thisplaye
r%) ELSEGCOL1,col12%(thisplayer%)

2040PLOT&4D,X%,y%:NEXT:ENDPROC

2050:

2060DEFPROCtitle

2070CLS:GCOL0,1:Y%=900

2080VDU5:FORX%=300TO340STEP4

2090MOVEX%,Y%:PRINT"D I Z Z Y D O T S
":Y%=Y%-2:NEXT

2100GCOL0,2:MOVE344,Y%-2:PRINT"D I Z Z
Y D O T S"

2110VDU4:ENDPROC

2120:

2130DEFPROCendgame

2140PROCtitle

2150hiscore%=0:nohi=0

2160VDU28,0,30,39,5,12

2170FORthisplayer%=0TOmax%-1

2180PRINT"player\$(thisplayer%):" scored
":score%(thisplayer%)

2190IFscore%(thisplayer%)>hiscore%:hisc
ore%=score%(thisplayer%):nohi=1 ELSEIFsc
ore%(thisplayer%)=hiscore%:nohi=nohi+1

2200NEXT

2210PRINT""CONGRATULATIONS ... ":

2220FORthisplayer%=0TOmax%

2230IFscore%(thisplayer%)=hiscore%THENP
RINTTAB(20)player\$(thisplayer%):", "

2240NEXT

2250PRINTTAB(10)"PRESS THE SPACE BAR"

2260REPEATUNTILGET=32

2270VDU26:ENDPROC

MODULA-2 & ADA

We offer Europe's largest selection
of Modula-2 and Ada subset compilers
for microcomputers.

MODULA-2 COMPILERS

Modula Corp (MS-DOS,Apple)	£ 85
JRT (CP/M-80)	£ 90
Volition (various)	from £ 265
Logitech (MS-DOS,CP/M-86)	£ 380

ADA (subset) COMPILERS

Augusta (CP/M-80)	£ 80
Supersoft (CP/M-80)	£ 155
Janus (CP/M-80,-86,MS-DOS)	from £ 265
Telesoft (IBM PC-XT)	£2500

Prices include delivery, but not VAT.

For more information call us.

GREY MATTER

H.E.L.P!

H.E.L.P!, the Health & Exercise Lifestyle Program for the APPLE II, is available now direct from the program authors. Assess your own health risk profile, measure your fat level using the Skinfold Calipers included with the package, and plan your own exercise lifestyle. Graphical displays and printouts are provided. The program includes a database for 10 users, so your family and friends can participate. Package consists of two disks, Skinfold Calipers, instruction manual and ring-binder..... £35

SLIMGUIDE, the revolutionary weight-watching program for APPLE and BBC (model B) computers. Follow the progress of your own diet/exercise regime by measuring your fat level using Skinfold Calipers provided with the program. Package consists of disk, instruction manual and Skinfold Calipers..... £25

Send cheque or P.O. (payable to H.E.L.P.) and please allow 14 days for delivery.

H.E.L.P!

2 Hillside Place, Newport-on-Tay,
Fife DD6 8DH, Scotland



NewBrain Newmon by Niels Larsen

This program is a machine code monitor for the NewBrain. The program is written in two parts, a loader and the data; this gives an enormous gain in speed when you load it at the expense of a little more complication when typing in.

If you do things in the following order there shouldn't be any problems:

- 1 NEW the machine code and make sure TOP>30000.
- 2 Enter the loader program.
- 3 SAVE it at the start of a blank tape, leaving the tape where it is.
- 4 NEW the machine again.
- 5 Enter the data program. This is best done in several sessions, saving to a separate tape until finished.
- 6 RUN it and correct any errors displayed.
- 7 Repeat step 6 until the program reports 'Press NEWLINE when tape-recorder ready.'
- 8 Press the RECORD button on the tape

recorder, and press NEWLINE.

- 9 NEWMON is now saved. When you want to use it, just load the loader program and RUN it.

Having done that, you're left with a very professional monitor capable of the following commands:

- A Lists an area of memory in ASCII.
Example: A1000 2000 lists from 1000 to 2000 in ASCII.
- B Returns to Basic with program and variables intact. NEWMON may be called again by entering 'CALL 27500'.
- C Calls a machine code program. The program must end with a RET (C9) command. On return to NEWMON, the Z80 registers will be displayed. Example: C6000 calls a program at 6000.
- D Disassembles an area of memory. Example: D5734 5926 disassembles from 5734 to 5926.
- E Edits an area of memory. The current

PRINTERS NEW LOW PRICES

Large selection available.
We specialise in interfacing to

SHARP

computers

Many other Interfaces for MZ80K and A Eprom Programmers ADC, relay output, etc.

Interface for MZ700 £39
UK orders add 15% VAT
Details on our complete range from

PETERSON
ELECTRONICS LTD
ACADEMY STREET, FORFAR,
TAYSIDE, DD8 2HA
Tel: 0307 62591

WD SOFTWARE

For the QL:

WD Utilities (3rd ed) (base £5.50)
view 60-file Directory on one screen, one-key LOAD, COPY or print 60 files with one key (allows for namesakes). Multiple FORMATTING to prevent corruption by stretching of tape. TOOLKIT to give dated, numbered modules in program development. PRUNE old files to release space (one key DELETES a file). Full instructions in QUILT file. Use up to 6 EXTRA MICRODRIVES (add on your Spectrum ones!)

WD Morse Tutor (base £4)
Specification as for Spectrum, but no speech (hurry up, Currah!)

RefQL (1st ed) (base £1)
100+ useful QL references in an ARCHIVE file.

For the 48K Spectrum:

WD Morse Tutor (base £4)
From absolute beginner to beyond RYA and Amateur. Radio receiving. Adjustable pitch. Set speed to your test level (4-19 wpm). Learn code with single characters, progress from groups with wide inter-character spaces to random sentences, decrease spacing to normal. Write down what you hear, then CHECK on Screen or Printer or LISTEN to phonetic TALKBACK from Currah MicroSpeech if fitted. Also own message, random figures, letters or mixed. 16K version on special request (no speech, only 5 sentences instead of 100).

Tradewind (base £4 — was £5!)
Sailing/trading strategy game with graphic surprises.

Jersey Quest (base £4 — was £5!)
Text adventure with Bergerac and the Dragon.

Prices:

Spectrum Cassettes — base price only
QL or Spectrum Microdrives — £4.50/cartridge plus base price

Two or more programs on one cartridge — pay cartridge + base. Eg. WD Utilities and RefQL for £11, but IMPOSSIBLE to mix QL and Spectrum programs on one cartridge. Send YOUR FORMATTed cartridge and pay base price only (but OURs have been FORMATTed AT LEAST six times)! Send OUR cartridge and 25p to update earlier editions.

WD Software

Hilltop, St Mary, Jersey Tel: (0534) 81392

BLANK CASSETTES

Guaranteed top quality computer/audio cassettes at great budget prices.

Packed in boxes of 10 with labels, inlay cards and library case.

Prices include VAT, post and packing.

□ (C5) £3.35 □ (C30) £4.70
□ (C10) £3.40 □ (C60) £5.30
□ (C12) £3.45 □ (C90) £7.00
□ (C15) £3.75

BASF FLOPPY DISKS

Prices of boxes of 10

□ 5 1/4 Single side/Double density £19.95
□ 5 1/4 Double side/Double density £21.85
□ 5 1/4 Double side/Quad density £28.75

MICRO FLEXI DISKS

Price per unit

□ 3 1/2 Single side £4.00 each

□ 3 1/2 Double side £4.75 each

Indicate quantity of each product required in boxes.

Free delivery UK only.

Cheque/PO Enclosed for £

NAME.....

ADDRESS.....

**PROFESSIONAL
MAGNETICS LTD**

Cassette House, 329 Hunslet Road, Leeds LS10 3YY
FREEPOST Tel: (0532) 706066 PCW/3/85

PRINTER BARGAINS

VAT & CARRIAGE INCLUDED

Brother M1009£178
Mannesmann Tally MT80£219
Shinwa CP80£199
Smith Corona TP-1£209
Epson RX80FT£254
Daisy Step 2000£269
Canon PW1080A£319
Kaga Taxan KP810£299

INTERFACE/CABLES

QL serial£11 QL parallel£35
BBC, Amstrad, Dragon, Oric£12
Spectrum parallel£35

OTHER BARGAINS

QL computer + Psion chess£399
Microvitec CUB monitor£259
Prism colour monitor£199
Philips hi-res monitor£87

STRONG COMPUTER SYSTEMS

Bryn Cottage, Peniel, Carmarthen, Dyfed

Telephone: 0267 231246 for assistance

PROGRAM FILE

contents of the address, which is shown, may be changed by entering a new number.

Example: E2000 3466 edits memory from 2000 to 3466.

F Finds a value in memory.

Example: F4000 7000 55 searches memory from 4000 to 7000 for the value 55.

H Lists an area of memory in hex and ASCII.

Example: H2000 3567 lists from 2000 to 3567 in hex and ASCII.

J Jumps to program.

Example: J2346 jumps to program at 2346.

M Moves an area of memory.

Example: M5567 5578 4400 moves memory block starting at 5567 and ending at 5578 to 4400.

P Sets new printer stream. Default stream is 8.

Example: P16 sets stream 16 as the stream on which to output to the printer.

R Relocates an area of memory. Used when relocating a program. Same as MOVE except that it changes all addresses within the block pointing to another address within the block. This is one of the most powerful commands, because it allows any program to be moved to another address. Newmon itself could be relocated.

Example: R3000 3145 4000 relocates program starting at 3000 and ending at 3145, to 4000.

S Selects width of screen. This command does not open a new screen, it just sets the width.

Example: S40 selects a 40-character screen.

T Edits an area of memory. Instead of entering a number, you can directly enter text with this command.

Example: T3000 3015 allows you to type text in 3000 to 3015.

V Verifies two memory blocks against each other. If two addresses differ, they will be displayed.

X Functions as very mini-calculator. When given two numbers, it displays the sum and difference of the numbers. It may also function as a hex to decimal convertor, because all the numbers are displayed in both hex and decimal.

Example: X4 7 calculates the sum and difference of 4 and 7.

Z Sets all locations in a block of memory to the same value.

Example: Z6000 7000 33 makes all locations between 6000 and 7000 equal to the value 33.

If a command doesn't have all the parameters given in the examples, the missing parameters are assumed to be 0; this is particularly helpful when using the E or T commands. You don't have to specify the end address because the command will keep on running until stopped by pressing '*'. The same technique may be used when using the A, D or H commands, except that these commands are stopped by pressing the ESCAPE key. They may also be halted temporarily by pressing the SPACE key. Pressing the SPACE key repeatedly will list one line for each keypress. Any other key will continue the automatic listing.

NEWMON LOADER

```
10 IF TOP>27300 RESERVE TOP-27300
20 CLOSE#1:OPEN#1,1
30 FOR I=27500 TO 32568:GET#1,A:POKE I,A:NEXT I
40 CLOSE#1:PUT#1:"TYPE 'CALL 27500' TO ENTER NEWMON"
50 END
```

NEWMON DATA

```
5 IF TOP>27500 RESERVE TOP-27500
10 FOR I=27500 TO 32568 STEP 16
15 CK=0
20 FOR J=I TO I+15
25 READ X
30 POKE J,X
35 CK=CK+X
40 NEXT J
45 READ C
50 IF C<CK THEN ?"ERROR IN LINE:";100+((I-27500)/16)*10:END
55 NEXT I
60 LINPUT("PRESS NEWLINE, WHEN TAPE-RECORDER READY")Z$
65 OPENOUT#1,1,CHR$(31)+"NEWMON Version:10.2"+CHR$(13)+CHR$(28)+"Please wait wh
ile loadins...."
70 FOR I=27500 TO 32568
75 PUT#1,PEEK(I)
80 NEXT I:CLOSE#1
85 END
100 DATA 205,154,108,17,188,108,205,176,119,49,108,107,175,6,11,33,1769
110 DATA 45,127,119,35,16,252,17,254,108,205,176,119,33,88,127,6,1727
120 DATA 0,205,7,119,254,8,40,16,119,254,45,40,77,0,0,0,1184
130 DATA 254,13,40,87,35,6,24,233,120,254,0,40,228,62,8,0,1402
140 DATA 0,0,5,43,24,219,254,48,216,254,58,56,8,254,65,216,1720
150 DATA 254,71,208,214,7,230,15,41,41,41,213,22,0,95,25,1518
160 DATA 209,201,125,2,3,124,2,3,33,0,0,201,82,69,65,68,1187
170 DATA 89,32,80,82,73,78,84,69,82,141,205,114,119,17,216,107,1588
180 DATA 205,176,119,205,7,119,62,255,50,45,127,17,88,127,26,50,1678
190 DATA 28,127,17,26,254,32,40,250,27,1,48,127,33,0,0,19,1031
200 DATA 26,254,32,32,5,205,206,107,24,242,254,13,40,9,254,45,1748
210 DATA 40,5,205,178,107,24,232,205,206,107,42,48,127,58,28,127,1739
220 DATA 254,65,202,13,109,254,66,202,169,108,254,68,202,162,109,254,2491
230 DATA 69,202,95,111,254,70,202,18,111,254,72,202,132,114,254,67,2227
240 DATA 202,0,114,254,74,32,1,233,254,77,202,170,111,254,80,32,2090
250 DATA 6,125,50,101,119,24,35,254,82,202,232,111,254,83,202,155,2035
260 DATA 113,254,84,202,136,111,254,86,202,179,111,254,87,202,45,111,2431
270 DATA 254,88,202,169,112,254,90,202,79,111,195,117,107,0,0,0,1980
280 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,225,237,462
290 DATA 115,182,108,229,221,34,184,108,253,34,186,108,201,237,123,182,2505
300 DATA 108,221,42,184,108,253,42,186,108,201,98,2,146,61,8,15,1783
```


PROGRAM FILE

MICROMART



THE ZENITH PC

AN EXCEPTIONAL
IBM CLONE

Completely IBM-PC compatible
better engineered
more reasonably priced.

128k, 1x360k, monitor	£1295
128k, 2x360k, monitor	£1495
320k, 2x360k, monitor	£1645
320k, 1x360k, mon, 10M Win	£2695
For colour monitor add	£ 245

For more information call us.

GREY MATTER

FED UP WITH INCOMPATIBILITY?

STANDARD 4:
SERIAL — 2-WAY CENTRONICS £84.95
(inc VAT, P&P)

STANDARD 3:
CENTRONICS — 2-WAY CENTRONICS £59.95
(inc VAT, P&P)

For computer owners who wish to drive more than one printer. Add £25 for additional ways. Reverse also possible at same price. Requires no power; includes both printer leads.

STANDARD 2:
SERIAL — 4-WAY SERIAL £59.95
(inc VAT, P&P)

For owners of computers with RS232 outputs who wish to talk to four different devices without swapping leads. Needs NO POWER. Supplied with any mix of sockets and leads.

STANDARD 1:
SERIAL — CENTRONICS CONVERTER £59.95
(inc VAT, P&P)

For owners of computers who wish to save money on printers. No special software required ... totally transparent to computer; needs no external power.

For owners of computers with RS232 outputs who wish to connect two (or more) printers and save money on leads and effort on swapping leads, as they are included. Add £25 for additional ways.

Especially suitable for:
EPSON HX20, PX8 NEWBRAIN, SINCLAIR SPECTRUM INTERFACE 1, QL, APPLE IIc, ETC. ... PLUS SPECIAL VERSION FOR CBM 64

Please enquire about our range of software for the NewBrain. All the above prices include VAT, postage and packing in EUROPE.

For other solutions, watch this space, or contact us at:

TYEPRO LIMITED
30 Campkin Road, CAMBRIDGE CB4 2NG
Tel: Day 0255 422087, Eve 0223 322394



BUSINESS & LEISURE on the Commodore 64

BUSICALC is easy to learn, easy to use. It's the ideal spreadsheet program for the home or small businesses.

Price was ~~£24.95~~ Now only **£17.95**

Have fun with **CRAZY KONG!** Excitement for the whole family.

Price was ~~£8.95~~ Now only **£3.95**

There are many more great programs in the SUPERSOFT catalogue. Send in the coupon below or telephone us on 01-861 1166.

Top Software from SUPERSOFT

To: SUPERSOFT, Winchester House, Canning Road, Harrow HA3 7SJ
I have a Commodore 64. Please rush me a free copy of your software catalogue, and send me the programs ticked below.

I enclose a cheque/postal order for £.....
Please charge my ACCESS card no.

☐ BUSICALC disk £19.95 ☐ BURGER CHASE tape £6.95
☐ BUSICALC tape £17.95 ☐ STIX tape £8.95
☐ CRAZY KONG tape £3.95 ☐ XERONS tape £5.95

Name
Address

WANTED

COMPUTER SYSTEMS

APPLE
SIRIUS
SUPERBRAIN
TELEVIDEO
IBM PC
OSBORNE
APRICOT

HARDWARE ACCESSORIES

FLOPPY DRIVES WINCHESTERS PRINTERS

NON-WORKING HOME COMPUTERS

Fair cash prices paid working or not.

Tel: 061-941 5732 (day)
062-587 8595 (night)

COMMODORE

We have the world's largest selection of software for the PET/CBM range. We supply to schools, universities, large and small companies, government departments, and of course home users.

We also manufacture add-on boards and plug-in chips that can make your computer more powerful — the most popular add-ons are our high resolution graphics boards which give your PET better resolution than an Apple!

IF YOU OWN OR USE A PET/CBM COMPUTER WRITE OR PHONE FOR A FREE CATALOGUE. By the way, we also offer software for the Commodore 64.

SUPERSOFT

Winchester House, Canning Road, Wealdstone,
Harrow, Middlesex, HA3 7SJ
Telephone: 01-861 1166

NORTH-EAST APPLE SALES PROMOTION

FREE HARDWARE AND SOFTWARE GIFTS WHEN YOU BUY AN APPLE COMPUTER

Special Offers apply to the full range of Apple Computers

For example, if you're thinking of buying a **MACINTOSH**, you may choose from selected free hardware and software from Apple's catalogue of hardware accessories, printers and software products. Special offers are only available at Newcastle Computer Services, authorised UK Apple dealer. For further information phone Tyneside (091) 276 1168 or 276 4323 without delay.

Offer closes on 30th April 1985.

NEWCASTLE COMPUTER SERVICES LTD

**906-908 Shields Road, Walkergate
Newcastle-Upon-Tyne NE6 4QP**

Full training, consultancy and after-sales support services available

[illegible]

MICROMART

THE CRACKER —

**TRANSLATOR —
Z80 to 8086/88**

DISASSEMBLER — Z80, 8086

CP/M Z80 £60 + VAT
CP/M 86, PC DOS, MSDOS, £80 + VAT

Software Technology

256 COLOURS FOR YOUR BBC MICRO!!

5-INCH PORTABLE MONITOR

PROFESSIONAL PAL ENCODER & UHF MODULATOR

Tel: 01-727 5956 or 07987-316
Please allow 28 days for delivery. *Mail Order only*

PCW 231

LOWEST PRICES IN UK?

MICROS	Prices inc VAT
Spectrum 48K (free six pack software)	£119.95
Spectrum Plus (free six pack software)	£169.95
Commodore Plus 1	£279.95
Commodore 64	£184.95
Commodore 64 (joysticks, cassette player and six games pack)	£239.95
Commodore 64 (cassette player, Simons basic programmers, reference guide, international soccer, joystick and sports bag)	£255.00
Commodore 16 (free cassette player/software)	£129.95
BBC B (free cassette player/software)	£389.00
BBC B (Econet fitted)	£445.00
BBC B + DFS	£445.00
Sinclair QL	£384.95
Acorn Electron starter pack	£224.95
Casio PB 700	£123.95
Casio FX 750P	£85.95
FOR YOUR MICRO	
QL 14" Monitor	£195.00
ZX Microdrive	£47.95
ZX Interface 1	£47.95
ZX Microdrive/Interface 1 (4 free games)	£97.00
ZX Interface 2 (free ROM)	£18.95
Microdrive Cartridge	£4.75
Quickshot II Joystick	£9.95
Commodore C2N Cassette Unit	£40.00
Commodore 1541 Disk Drive (free Easy Script)	£189.95
Commodore MPS 801 printer	£189.95
Commodore MPS 802 printer (Free Easy Script/Future Finance)	£339.95
Commodore 64 with cassette unit	£219.95
Alphacom 32 printer	£89.95
Epson RX80FT	£255.00
Brother EP44	£239.00

Complete range of Spectrum/Commodore add ons at discount prices.
Prices/Goods subject to availability and change without notice.
P&P £3.00 (within UK)



Trade and export enquiries welcome
K.K. STATIONERS

187 Edgware Road
Marble Arch W2 1ET
Tel: 01-723 1436

126 Edgware Road
Marble Arch W2 2DZ
Tel: 01-402 4592

NEW!
HIGH SPEED

TOUCH TYPE

FOR THE 48K Sinclair Spectrum and
Spectrum Plus

NEW!
Spectrum Plus
Version

DO YOU YEARN TO DO SOMETHING
USEFUL ON YOUR SPECTRUM?

Are you fed up with silly games? Make this the moment you take a step forward using your Spectrum into the world of "The Office of the Future!"
Learn to touch type on any QWERTY keyboard using the Spectrum as the teaching machine.

- * Full touch typing (no eyes down to the keyboard) from the first lesson.
- * Carefully designed lessons progress from key learning to speed practice at each stage.
- * Full ten finger touch typing with correct left and right shift key operation.
- * Learning psychology built in to the program to keep you motivated and interested in progressing.
- * Full feedback of performance — you know it is working — you are learning to type.
- * Learn at your own pace neither hurried nor restricted by other pupils.
- * Comprehensive instruction manual included with every cassette.
- In the age of computers isn't it time YOU learned to type!

£8.95 inc p&p and VAT.

Please specify Spectrum or Spectrum Plus

To: JCS Software, 1 Paddocks Close, Cobham, Surrey KT11 2BD
O.K. I'm ready to step forward and improve my ability. Please rush me a copy of TOUCH-TYPE for the 48K Spectrum. I enclose a cheque for £8.95 (Please make cheques payable to JCS Software.) Tel: 0932 65354. Dealer enquiries welcome.

Name.....
Address.....

Spectrum or Spectrum Plus
(Delete as appropriate)

TOUCH-TYPE TOUCH-TYPE TOUCH-TYPE
TOUCH-TYPE For The Spectrum 48K

PCW Mar

WANTED PERSONAL COMPUTERS

IBM, TANDY, EPSON, etc
all models bought for cash

**MORGAN CAMERA
COMPANY**

160 Tottenham Court Road,
London W1.

Tel: 01-388 2562

PROGRAM FILE

```

370 CALL "STPLOT",0,Y,VARADR(T#),GN:CALL "STPLOT",39*8,Y,VARADR(T#),GN
380 NEXT
390 FOR R=0 TO 180
400 X=B*INT(1+RND(1)*38)
410 Y=B*INT(1+RND(1)*21)
420 CALL "RDOUT",X+7,Y,VAR "R(PP)": IF PP THEN RANDOMIZE:GOTO 400
430 CALL "STPLOT",X,Y,VARADR(B#),BU
440 NEXT
450 HX=B*INT(1+RND(1)*38)
460 HY=B*INT(1+RND(1)*21)
470 CALL "RDOUT",HX+4,HY+4,VARADR(PP): IF PP THEN RANDOMIZE: GOTO 450
480 CALL "STPLOT",HX,HY,VARADR(H#),RD
490 FOR M=0 TO NM
500 MX(M)=B*INT(1+RND(1)*38)
510 MY(M)=B*INT(1+RND(1)*21)
520 IF ABS(HX-MX(M))<40 AND ABS(HY-MY(M))<40 THEN 500
530 CALL "RDOUT",MX(M)+4,MY(M)+4,VARADR(PP): IF PP THEN RANDOMIZE :GOTO 500
540 CALL "STPLOT",MX(M),MY(M),VARADR(M#),RD
550 NEXT
560 REM WARNING SHRIEK AND GAME STARTS....
570 :
580 FOR T=1 TO 20+RND(1):PUT27,64,20,3,65,7:PUT27,64,5,3,65,7:NEXT
590 M=0
600 X=0:Y=0
610 TT=0
620 REM START OF MAIN LOOP
630 :
640 G=GET(DL):IF G=0 THEN 690
650 IF G=ASC("F") THEN HALT=GET():GOTO 640
660 X=(G=1) OR (G=LT) OR (G=RT) OR (G=F4)))
670 Y=(G=F3) OR (G=DN) OR (G=F4) OR (-1*((G=F1) OR (G=UP) OR (G=F2)))
680 X=X*8:Y=Y*8
690 TT=TT+.5:PUT22,0,0,"TIME TAKEN "+STR$(TT)+" "
700 IF X<0 OR Y<0 THEN CALL "RDOUT",HX+X+4,HY+Y+4,VARADR(PP):IF PP THEN 750
710 IF X OR Y THEN CALL "STPLOT",HX,HY,VARADR(SP#),O
720 HX=HX+X:HY=HY+Y
730 CALL "STPLOT",HX,HY,VARADR(H#),RD
740 GOTO 880
750 REM HIT OBSTACLE
760 :
770 IF PP=GN THEN 880
780 IF PP=RD THEN 1120
790 L=0
800 L=L+1:REM LEN PILE
810 PX=HX+X*8:PY=HY+Y*8
820 CALL "RDOUT",PX+4,PY+4,VARADR(PQ):REM FIND CHARACTER AT END OF PILE
830 IF PQ=RD OR PQ=GN THEN 880
840 IF PQ=BU THEN GOTO 800
850 CALL "STPLOT",PX,PY,VARADR(B#),BU:CALL "STPLOT",HX,HY,VARADR(SP#),O
860 HX=HX+X:HY=HY+Y
870 CALL "STPLOT",HX,HY,VARADR(SP#),O:CALL "STPLOT",HX,HY,VARADR(H#),RD
880 REM MOVE MONSTERS
890 :
900 DX=B*SGN(HX-MX(M)):DY=B*SGN(HY-MY(M)): REM DIRECT HEADING
910 CALL "RDOUT",MX(M)+DX+4,MY(M)+DY+4,VARADR(PP)
920 IF PP<>0 THEN 950
930 CALL "STPLOT",MX(M),MY(M),VARADR(SP#),O:MX(M)=MX(M)+DX:MY(M)=MY(M)+DY
940 CALL "STPLOT",MX(M),MY(M),VARADR(M#),RD:GOTO 1070
950 IF PP=RD AND MX(M)+DX=HX AND MY(M)+DY=HY THEN 1120
960 IF DX=0 THEN DX=B
970 IF DY=0 THEN DY=B
980 T=0
990 FOR XX=DX TO -DX STEP-DX
1000 FOR YY=DY TO -DY STEP-DY
1010 CALL "RDOUT",MX(M)+XX+4,MY(M)+YY+4,VARADR(PP)
1020 IF PP<>0 THEN 1050
1030 CALL "STPLOT",MX(M),MY(M),VARADR(SP#),O:MX(M)=MX(M)+XX:MY(M)=MY(M)+YY:CALL "S
TLOT",MX(M),MY(M),VARADR(M#),RD
1040 YY=2*-DY:XX=2*-DX:T=1
1050 NEXT YY,XX
1060 IF T=0 THEN MT(M)=1
1070 FOR Q=0 TO NM:IF MT(Q)=0 THEN Q=NM+3
1080 NEXT:IF Q<NM+4 THEN 1250
1090 M=M+1+((NM+1)*(M=NM)):MT(M)=0:GOTO 640
1100 REM YOU'VE BEEN GOT
1110 :
1120 CALL "STPLOT",MX(M),MY(M),VARADR(SP#),O:CALL "STPLOT",HX,HY,VARADR(SP#),O:CAL
L "STPLOT",HX,HY,VARADR(M#),RD
1130 NM=NM-1-(NM=1)
1140 FOR T=0 TO 10
1150 PUT27,64,100,4,65,7
1160 PUT27,64,20,4,65,7
1170 CALL "COLOUR",RD,T*25
1180 NEXT
1190 IF GET(O)<>0 THEN 1190
1200 ?"ANOTHER GO (Y/N) ?":G$=GET():IF G$="N" OR G$="n" THEN 1230
1210 TT=0
1220 GOTO 300
1230 TEXT
1240 GOTO 1320
1250 REM YOU GOT 'EM
1260 :
1270 NM=NM+1:FOR T=0 TO NM:MT(T)=0:NEXT
1280 FOR T=0 TO 5
1290 FOR D=250 TO 10 STEP-10
1300 PUT27,64,D,2,65,7:NEXTD,T
1310 GOTO 1200
1320 CALL "CLEAR":END
1330 :
1340 :
1350 REM SET UP GRAPHICS STUFF
1360 :
1370 TEXT:PUT12:CALL "RESOLUTION",0,2
1380 A$="MONSTERS"
1390 CALL "CHARSIZE",4,4
1400 CALL "COLOUR",3,0
1410 CALL "STPLOT",20,150,VARADR(A#),3
1420 CALL "DEFCHAR",0,36,21,77,105,58,28,24,24
1430 T$=CHR$(0)
1440 CALL "DEFCHAR",1,28,28,72,126,27,120,78,194
1450 H$=CHR$(1)
1460 CALL "DEFCHAR",2,0,60,94,111,113,113,49,31
1470 B$=CHR$(2)
1480 CALL "DEFCHAR",3,68,170,16,124,214,124,40,108
1490 M$=CHR$(3)
1500 CALL "DEFCHAR",4,255,255,255,255,255,255,255,255
1510 SP$=CHR$(4)
1520 GN=2:BU=3:RD=1
1530 CALL "STPLOT",60,50,VARADR(M#),GN
1540 CALL "STPLOT",180,50,VARADR(M#),GN
1550 CALL "STPLOT",120,50,VARADR(H#),RD
1560 FOR T=0 TO 255:CALL "COLOUR",3,T:NEXT

```


PROGRAM FILE

```

1570 PUT12,"PRESS 'H' FOR HELP OR ANY KEY TO START"
1580 PLOT14,35,"An Epic by P.Ramsden"
1590 G=GET():IF G=ASC("H") OR G=ASC("h") THEN GOSUB 1620
1600 CALL"CHARSIZE",1,1
1610 RETURN
1620 REM INSTRUCTIONS (TELL 'EM WHAT TO DO)
1630 :
1640 CALL"CLEAR"
1650 PUT31
1660 ?TAB(12);"JUNGLE!"
1670 ?TAB(12);"=====
1680 ??:?"You are a brave adventurer in a jungle"
1690 ?"clearing. You are suddenly aware of eyes"
1700 ?"staring at you from behind the rocks "
1710 ?"strewn around the clearing. Then with a"
1720 ?"spine-chilling scream the monsters leap"
1730 ?"out and come after you!"
1740 ??:?"You find that you are able to push the"
1750 ?"rocks around and are able to make traps."
1760 ??:?"If you are clever you might be able to "
1770 ?"lure the beasts into the traps and "
1780 ?"perhaps even manage to squash them. "
1790 ?" -you'll be lucky!"
1800 ??:?"Use the cursor/Function keys to move"
1810 ??:?"PRESS ANY KEY TO CONTINUE":G=GET()
1820 PUT31
1830 ?"Do you wish to re-define the movement keys ? (Y/N)"
1840 G$=GET():IF G$<>"Y" AND G$<>"y" THEN GOTO 1900
1850 ?"Press the key for UP ":UP=GET()
1860 ?"Press the key for DOWN ":DN=GET()
1870 ?"Press the key for RIGHT ":RT=GET()
1880 ?"Press the key for LEFT ":LT=GET()
1890 ??:?"OK. Thanks. The diagonals are still on keys F1 to F4."
1900 ??:?"Are you using a black & white monitor (Y/N)"
1910 BW=0
1920 G$=GET():IF G$<>"Y" AND G$<>"y" THEN GOTO1940
1930 BW=1:CALL"COLOUR",1,255:CALL"COLOUR",3,128
1940 PUT31:RETURN
    
```



Atari Multi-Mode Text by Garry Whittaker

Much has been written about the problems of getting text onto a graphics screen with Atari home computers, but most of the solutions have relied on large amounts of data statements to define the character set in terms of plot positions, and virtually all have offered text in only one graphics mode. This short utility allows you to print text in any graphics mode.

The first listing is the actual machine code routine and should be saved before running. There is a checksum, so if upon running you receive the message 'You have a data error', correct the error in the data statements and re-run. The second listing is a demonstration of how to use the program.

As well as printing text on a graphics

screen, the second listing also shows how the program can be used to obtain the following effects:

- 1 Printing text at any pixel on the screen.
- 2 Smooth pixel scrolling of a single character (good for animation).
- 3 Different sizes and textures of text. Produced by varying the internal graphics registers.
- 4 Large text can be produced in graphics 0 by treating each character position as a pixel.
- 5 Multiple character sets can be displayed onscreen at the same time.

After correctly typing in and running listing one, type in the necessary lines of listing two for the demo.

```

100 REM NOTE THE REMARKS IN THIS PROG.
110 REM MAKE IT LOOK LONG & DIFFICULT,
120 REM IT IS NOT! THE ACTUAL ROUTINE
130 REM IS SHORT AND EASY TO USE IN
140 REM YOUR OWN PROGRAMS - WHILE AT
150 REM THE SAME TIME BEING A VERY
160 REM FLEXIBLE WAY OF DISPLAYING
170 REM TEXT ON ANY ATARI GRAPHICS
180 REM SCREEN - DO NOT BE AFRAID TO
190 REM EXPERIMENT
200 REM
210 REM
220 REM
230 REM
240 REM
    
```

MULTI-MODE ATARI GRAPHICS INDEPENDANT CHARACTERS	BY Garry. J. Whittaker
--	------------------------------

```

*****ALL GRAPHIC MODE*****
*****TEXT DISPLAY*****
*****DEMONSTRATION*****
    
```

```

220 REM
230 GOSUB 520:REM INITIALISE MCS -
240 CHSET=PEEK(756)*256:REM .....
    **CHARACTER SET POSITION DOES NOT **
    
```

MICROMART

FLOPPY DISK DRIVES STOCK CLEARANCE

Brand new Toshiba double-sided,
double-density 8" drives, £99 +
VAT + carriage

Version with built-in controller,
£119 + VAT + carriage

Full user and service manuals

MONOLITH ELECTRONICS CO LTD

5-7 CHURCH STREET
KREWKERNE, SOMERSET
TA18 7HR

Tel: (0460) 74321

KINGSLEY ENTERPRISES

Organise your files on
CenTech Colour
discs

Specialists in all kinds of floppy diskettes

MAIL ORDER ONLY — ALL PRICES EXCLUDE VAT @ 15%

Diskette Prices per box of 10	1 box	2-4	5-9	10+
3" HITACHI	SS/DD 96	44.38	39.94	38.83
3.5" SONY	SS/DD 96	36.00	34.31	33.36
5.25" BASF	SS/DD 96	50.00	45.00	43.75
	SS/DD 48	13.13	11.81	11.48
	SS/DD 48	16.25	14.63	14.22
	DS/DD 48	19.38	17.44	16.95
	SD/DD 96	20.63	18.56	18.05
5.25" CENTECH	SS/DD 96	23.75	21.38	20.78
	SS/DD 48	18.20	16.46	16.00
	DS/DD 48	24.25	21.83	21.22
	SS/DD 96	24.25	21.83	21.22
5.25" CUMANA	SS/DD 96	32.06	28.86	28.05
5.25" DYSAN	SS/DD 48	18.13	16.61	15.86
	DS/DD 48	26.50	23.85	23.19
	SS/DD 96	26.50	23.85	23.19
	SS/DD 48	33.63	30.26	29.42
5.25" NASHUA	SS/DD 48	14.00	12.60	12.25
	SS/DD 48	14.87	13.39	13.02
	DS/DD 48	17.75	15.98	15.53
	SS/DD 96	18.63	16.76	16.30
5.25" SCOTCH-3M	SS/DD 96	20.63	18.56	18.05
	SS/DD 48	15.63	14.06	13.67
	DS/DD 48	19.38	17.44	16.95
	SS/DD 96	23.13	20.81	20.23
	DS/DD 96	25.00	22.50	21.88

8" hard sector and pre-formatted diskettes available

20-30% Discounts on Software — Sample Software Prices (IBM PC):

Framework	£321	CIS Cobol 86	£490	MS-Project	£180
Friday	£135	Lotus 1-2-3	£285	MS-Pascal	£125
dBasell	£245	Symphony	£415	Multimate	£230
dBasell	£321	Wordstar Prof.	£280	Open Access	£330
		MS-Chart	£180	Supercalc 3	£225

KINGSLEY ENTERPRISES
87 Whitefield Road
Stockton Heath
Warrington
WA4 6NB

Please ADD the following Postage Diskette ORDER:-
1 Box FREE, 2-4 Boxes £1.00.
5-9 Boxes £2.00, £2.50 per 10 Boxes
Please ADD £5 Postage per Software ORDER
Prices correct at time of going to Press

EXECUTIVE SYSTEMS

SANYO MBC550 + Software	£589.00
SANYO MBC555 + Software	£789.00
SANYO MBC550-2 + Software	£789.00
SANYO MBC555-2 + Software	£1,099.00
SANYO Green Monitor	£89.00
SANYO Colour Monitor	£379.00
SANYO RS-232 Interface	£49.00
CANNON PJ1080A Colour Printer	£399.00
CANNON PW1080A	£275.00
CANNON PW1156A	£355.00
SHINWA CP80	£155.00
JUKI 6100 Daisy	£315.00
JUKI 6300 Daisy	£635.00
DAISY Junior	£189.00

LOZ SYSTEMS

Tel: (0708) 20262

Callers by appointment only. Please add
£15 postage & packing plus 15% Value
Added Tax



DEMO SALE



We like to turn our demonstration equipment regularly. Most equipment is only a few months old and has only had a few hours use as demonstration equipment. To give you an even better deal, we are offering you a 25% discount on the same value of new and unused equipment or software as you buy at the sale price. All equipment is subject to full original warranty.

	List	Sale (ex VAT)
Sanyo MB5550/555 low cost 16-bit MSDOS System, excluding Monitor		
550 Single Disk including Wordstar	£749	£495
555 Dual Disk including Wordstar, Calcastor, Infostar, Reportstar	£999	£695
NEC APC with Colour Graphics and 256K Memory	£399	£299
8KB Expansion Chips for NEC8201	£3514	£2495
Canon X-07	£52	£39
Canon X-07 Peripherals	£249	£169
Texas CC-40 Peripherals		CALL
Epson HX-20, QX-10, LQ1500		CALL

We sell, service and support all Epson products and specialise in Bar Code, Communication and Data Capture.



The Computer Centre
Bugbrooke Road, GAYTON
NORTHAMPTON NN7 3EU
: (0604) 858011

**OUTSTANDING
OPPORTUNITY**

**WORLD'S FOREMOST
COMPUTER INFORMATION
COMPANY**

**TECHNICAL
EDITORS**

MAIDENHEAD

Datapro Research Corporation is a key part of McGraw-Hill's multi-billion dollar operation with businesses and career opportunities world-wide. Datapro is the business computer industry's leading publisher of looseleaf reference materials, supplying over 60,000 professional computer users in 72 countries. Its 19 main information services cover computers, software, telecommunications, data communications, office automation and similar sectors.

We now wish to expand our editorial department by appointing several junior to senior level technical editors, with a knowledge of at least one of the above areas and, preferably, with some experience of the emerging trends and techniques elsewhere in Europe, especially France, West Germany and Italy. There is considerable scope for job development and some European travel may be necessary. For this reason, a working knowledge of French and/or German would be an advantage.

Apart from outstanding career prospects within McGraw-Hill, there is an excellent commencing salary (dependent on experience) and an attractive benefits package.

Please write in confidence to:

**Paul Jenkinson, UK and
European Personnel Director
McGraw-Hill House,
Shoppenhangers Road,
Maidenhead, Berkshire SL6 2QL
Tel: Maidenhead (0628) 23431**



```

***NEED TO START ON EVEN BOUNDARY ***
250 CHWIDTH=8:REM CHARACTER WIDTH IN
    BITS
260 X=0:Y=0:REM X Y POSITION ONLY
    LIMITED BY GR. MODE...
270 GRMODE=7:REM .....GRAPHICS MODE
    - NOTE THIS IS ONLY INCLUDED AS A
    REMINDER THAT GR. MODE NEEDS TO BE SET
280 INK=0:REM FOREGROUND COLOUR - USE
    THE SAME PARAMETER AS
    COLOR IN BASIC
290 PAPER=9:REM BACKGROUND COLOUR.....
300 TEXT$="Hello readers of ":REM ....
    NOTE THAT AS THE FIRST CALL IS TO THE
    WHOLE ROUTINE TEXT$ DOES NOT END IN
310 REM
320 REM *****ALL GRAPHIC MODE*****
    TEXT DISPLAY
    *****TITLE PAGE*****
330 REM THE FOLLOWING ROUTINE DISPLAYS
    THE MAGIC TITLE PAGE. NOTE USE
    OF INK,PAPER,TEXT$,X,Y,CHWIDTH
340 REM ALSO NOTE THE USE OF POKE 87,9
    TO FOOL THE OPERATING SYSTEM
    INTO THINKING IT IS IN GR.9
350 REM THE PATTERNED EFFECT IS DUE
    TO GR.9 ACCEPTING DATA FOR
    EACH POINT RATHER THAN JUST A
360 REM COLOUR FROM INK AND PAPER TRY
    CHANGING THESE PARAMETERS.....
370 GOSUB 690:X=A:INK=2:TEXT$="PCM":G
    OSUB 710:X=A:TEXT$="This is ":GOSUB 7
    10
380 X=A:INK=2:PAPER=3:TEXT$="20":GOSU
    B 710:X=A:INK=2:PAPER=1:TEXT$=" Char/L
    ine":GOSUB 710
390 Y=8:FOR X=25 TO 80 STEP 1:Y=Y+1:PA
    PER=X-19:INK=PAPER-2:TEXT$="MAGIC":G
    OSUB 710:NEXT X
400 FOR Y=64 TO 58 STEP -1:PAPER=Y-56:
    INK=PAPER-2:X=X+1:GOSUB 710:NEXT Y
410 Y=8:FOR X=80 TO 25 STEP -1:Y=Y+1:P
    APER=X-19:INK=PAPER-2:TEXT$="MAGIC":G
    OSUB 710:NEXT X
420 X=17:Y=35:POKE 87,9:GOSUB 710:REM
    YOU CAN STILL FOOL THE OPERATING SYSTE
    M WITH POKE 87,GRAPHICS MODE
430 ? "PRESS ANY KEY TO CONTINUE"
440 POKE 764,255
450 IF PEEK(764)=255 THEN 450
460 GRAPHICS 8:X=8:Y=0:INK=255:PAPER=3
    2:TEXT$="Multimode Atari Graphics Inde
    pendant"
470 FOR CHWIDTH=3 TO 8:GOSUB 710:NEXT
    CHWIDTH:REM YOU CAN VARY THE WIDTH IN
    BITS OF THE CHARACTERS
480 CHWIDTH=7:TEXT$="CHARACTERS":X=8:
    Y=Y+10:GOSUB 710:POKE 87,7:X=4:GOSUB 7
    10:X=2:POKE 87,9:GOSUB 710
490 END
500 REM THE FOLLOWING CODE IS WHAT
    ACTUALLY DOES THE WORK I WOULD
    SUGGEST YOU LIST IT TO CASSTTE
510 REM OR DISK FOR INCLUSION IN YOUR
    OWN PROGRAMS
520 REM *****ALL GRAPHIC MODE*****
    TEXT DISPLAY
    *****INITIALISE*****
530 REM
540 DIM MC$(210),TEXT$(256)
550 MC$="hh,Oh,Thh,Oh,Hh,Ahh,Vh,Oh,Zh

```


MICROMART

Every computer needs
CHATTERBOX II
 "Listen creep, I am the leader..."

For **ZX81**
SPECTRUM
 BBC
 TRS-80
 APPLE
 NASCOM
 VIC PET 64
 (Please state)



SPEECH SYNTHESIS
 by
WILLIAM STUART SYSTEMS

NEW!
 EXCLUSIVE!

PITCH CONTROL

S99 COMPLETE OR £33 (OVI KIT)

CHATTERBOX II™

can say anything!

Genuine phoneme synthesis - not just recorded speech - hence unlimited vocabulary. Programmable pitch for more natural intonation (exclusive to Wm Stuart Systems) - solid tone cabinet for quality sound - integral beep music amplifier. **PLUS** expansion socket for **BIG EARS** voice recognition system: Full instructions technical notes and software supplied with this outstanding educational unit.

DEALER ENQUIRIES WELCOME

As seen on BBC TV "Computer Programme"

BIG EARS

SPEECH INPUT FOR ANY COMPUTER

Hugely successful Speech Recognition System complete with microphone software and full instructions

BUILT TESTED & GUARANTEED
 PLEASE STATE COMPUTER UK101
 SPECTRUM.ATOM.NASCOM2 102. Micron.
 ZX80 81. PET TRS80. MZ80K APPLE II. BBC MICRO. CBM 64



ONLY £49

ZX81/SPECTRUM

MUSIC SYNTHESISER (Stereo) - 16 LINE CONTROL (Port)

Play 3-part music, sound effects, drums etc. Full control of attack, decay and frequency. Input Output lines provide control and monitor facility for Home Security, Robot Control, Model Railway etc. etc. Works with or without 16K RAM

Full instructions software included
 Add keyboard to make a live performance polyphonic synthesiser!
 Note - up to 3 units can be used simultaneously giving 9 music channels & 48 x 0 lines

NEW!

VIBRATO CONTROL



AMAZING VALUE AT ONLY
£19.50 (KIT)
£25.50 (BUILT)

S
O
F
T
W
A
R
E

THE COMPOSER

Synthesiser Music Programme
 Enter & play 3 part harmony includes demonstrations (Spectrum ZX81 recommended) £7

ZX ARP/DRUMSEQ

Fascinating synthesiser demonstrations. Generates automatic sequences and plays from keyboard. Some wave effects (Spectrum) £6

TALKING HANGMAN

For Chatterbox! The classic game claims its victims with a dry voice accompaniment (Spectrum) £6



CHROMACODE??????

Can you defuse the bomb by cracking the code? combination before time runs out? Wm Stuart Chatterbox voice output (Spectrum) £6

COLOUR MODULATOR

RGB in. PAL. UHF out (not for ZX)

Please add VAT at 15% to prices.
 Barclay Access orders accepted by telephone

WILLIAM STUART SYSTEMS Ltd

Quarley Down House
 Cholderton
 Nr. Salisbury
 Wiltshire SP4 0DZ
 Tel: 098 064 235

kit £16
BUILT £22

All enquiries
S A E please



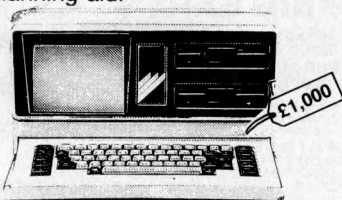



WREN'S PORTABLE COMPUTER

The complete business portable, brimming with superb facilities

Excellent software accompanies the Wren including Perfect Writer (word processor)

- Perfect Calc (spreadsheet)
- Perfect File (database)
- Plus an executive desk top planning aid.



What the reviewers say

- "... with a built in B.T. approved modem there were no problems connecting up to Prestel and Micronet 800."
 - "... with BBC Basic and CP/M3 and the supplied software Wren represents an impressive package."
 - "... Final verdict, good value for money, good looking and impressive machine."
- ★ JUST ARRIVED two programmes Pascal. Wrenchat communications programmes including Telecom Gold.

Available now for immediate delivery:

PLEASE ADD VAT TO THE ABOVE PRICE
+ P&P OR SEND FOR DETAILS TO:

ELSTREE COMPUTER CENTRE

ELSTREE AERODROME,
ELSTREE, HERTS WD6 3AW
CREDIT CARD HOTLINE

01-953 9021

24 Hour Delivery



YOU CAN TEACH BASIC

The PROTOS System contains all the information you need: Organisers manual, Tutors manual, full lecture notes, handouts, visual aid guide, how to advertise ... and a FREE back-up service by phone.

The PROTOS System costs are covered by just 3 students at home ... but is designed for up to 40.

NOW full RS232 for the Amstrad RX, TX, RTS, CTS/DTR. Switchable baud rates £49.95 including driver software

For more details and application form write NOW to:

DEPT PCW2, THE COMPUTER GROUP
OAKLEA, GOLDHANGER ROAD
MALDON, ESSEX CM9 7QU
OR RING 0621 58091 NOW

PROTOS

```

80REM ****      Model B
90REM ****      1.00 O.S. or above
100REM **** Smooth Scrolling text,in Mode 2 ****
110REM **** (C) Copyright A.J.Thomas 1984 ****
120MODE2
130VDU23;10,32,0;0;0;23,224,66,36,255,153,189,231,90,195
140DIM TEXT 255
150$TEXT="This is an example of smooth scrolling in mode
      2.It could be used for titles in games, or for scrolling
      little characters "+CHR$224+CHR$224+CHR$224+"
      What ever you wish! "+CHR$224+" "+CHR$224+"
160?&80=0:?&81=0
170PROCASS:COLOUR2:PRINTTAB(0,4);
" You may use the 'scroll' routine in your programs."
180COLOUR1
190CALLmain
200COLOUR7
210END
220DEFPROCASS
230DIM CODE 200
240FORI%=0TO2STEP2
250P%=CODE
260IOPTI%
270.scroll LDA#0:STA&78:LDA&7C:STA&70:LDA&7D:
      STA&71:LDA&7C:CLC:ADC#8:STA&74:LDA&7D:
      ADC#0:STA&75:LDY#0

280.scloop
290LDA(&74),Y:STA(&70),Y
300INY:CPY#8:BNE scloop
310LDY#0
320LDA&70:CLC:ADC#8:STA&70:LDA&71:ADC#0:STA&71
330LDA&74:CLC:ADC#8:STA&74:LDA&75:ADC#0:STA&75
340INC&78
350LDA&78:CMP#80:BNEscloop
360RTS
370.getnums JSRcheck:.gnloop
380LDA#80:STA&7C:LDA#85D:STA&7D:JSRscroll
390LDA#19:JSR&FFF4
400RTS
410.ptext
420LDX&80
430LDA#31:JSR&FFEE:LDA#19:
      JSR&FFEE:LDA#18:JSR&FFEE
440LDA TEXT,X:JSR&FFEE
450INC&80:LDA#0:STA&81
460RTS:.check INC&81:LDA&81:CMP#4:BEQptext
470RTS
480.main
490JSRgetnums
500LDA#167:CMP&80:BNEmain
510RTS:]
520NEXT
530ENDPROC
    
```



BBC Anti-List Utility

by Daniel Greenspan

This is a short but powerful utility for the BBC Micro; it will protect any Basic

PROGRAM FILE

program from being listed.

Instructions

1 Type in and run the program with a blank tape or disk installed.

2 Load the program to be protected.

3 If using tape rewind and press PLAY.

4 SAVE your program in the normal program.

5 List your program.

```

10 REM **PROTECTION UTILITY**
20 *SPOOL PRTEC
30 PRINT "REN. 20,20"
40 FOR I=10 TO 4000 STEP 20
50 PRINT;I;"REM !!!!!"
60 NEXT I
70 FOR I=1 TO 100:X=RND(4000)
80 IF X MOD 10 = 0 THEN NEXT I
90 PRINT;X;"REM !!!!!"
100 IF I<90 THEN NEXT I
110 PRINT "FOR I=PAGE TO TOP:IF
    ?I=33 AND I?1=33 AND I?2=33
    AND I?3=33 THEN
    ?I=6:I?1=7:I?2=
    12:I?3=21:N. I:ELSE: N.I"
120 PRINT "20000REM!!!!"
130 PRINT "FOR I=PAGE TO TOP:IF
    ?I=33 AND I?1=33 AND I?2=33
    AND I?3=33 THEN ?I=6:I?1=7:
    I?2=12:I?3=6:N. I:ELSE: N.I"
140 PRINT "REN."
150 *SPOOL
    
```

PCW is interested in programs written in any of the major programming languages for all home and small business micros. When submitting programs please include a cassette or disk version of your program, brief but comprehensive documentation, and a listing on plain white paper — typed if you have no printer.

Please ensure that the software itself, the documentation and the listing are all marked with your name, address, program title, machine (along with any minimum requirements) and — if possible — a daytime phone number.

All programs should be fully debugged and your own original, unpublished work.

We prefer to receive programs with a maximum 80-column width printed in emphasised typeface.

Please keep a copy of everything.

Programs are paid for at the rate of £50 per page of published listing, plus a £50 bonus for the Program of the Month. Send your contributions to Nick Walker, PCW Programs, 62 Oxford St, London W1A 2HG. **END**

MICROMART

**NO GIMMICKS!
NO WAFFLE!
SIMPLY THE
BEST PRICE!**

WORDSTAR PROFESSIONAL PACK

For  Personal Computer
£299

VER. 3.40

The latest version!

 **apple**

**SAMPLE PRICES
ON SOFTWARE**

OVERSEAS AND TRADE
ENQUIRIES WELCOME

WORDSTAR PROFESSIONAL PACK VER. 3.3	£299
SUPERCALC 2/3	£135/£209
d BASE 2	£299
d BASE 3/FRAWORK	£349
OPEN ACCESS	£353
MULTIMATE V3.2 (UK)	£259
LOTUS 1-2-3	£295
SYMPHONY	£440
R BASE 4000	£255
FILE VISION	£139
TK SOLVER	£239
KNOWLEDGE MANAGER	£325
FRIDAY!	£159

By popular demand we are able to supply business, educational and recreational software at DISCOUNT PRICES for the following machines: Apple, Atari, BBC, Commodore, Vic 20, DEC Rainbow, IBM, ICL, Epson, Sinclair, Sirius, Spectrum, Texas, TRS 80, CPM 5¼ or 8 inch.

Please send SAE for full list

NEW PRODUCTS FOR IBM PC

SPOTLIGHT	£89
DESO	TBA
PLEASE	£249
ELECTRIC DESK	£225
CONCURRENT PC DOS	£189
STARLINK MULTIUSER	£1395
GRAPHIX PARTNER (everyone must have one)	£99
PROKEY (and one of these too)	£89
FORTAN-77	£219
GSX	£219

Demo disks and literature are available for many of these products.

University, College and Public Authority orders welcome.

All prices plus VAT in UK. Phone your Access or Barclaycard number for immediate despatch (software sent post free by recorded delivery)
Send any other ad to us and we'll beat the price.

**Photographic & Optical
Services Ltd**

129-137 STANLEY ROAD
TEDDINGTON, MIDDX.

Tel: 01-977 3498

Now open
6 days a week!

Answering machine after business hours.
Offers subject to availability.
Telephone first to reserve.

Telex No. 885463 (Photo G)

EDUCATION

EDUCATION

EDUCATION

FULL-TIME TRAINING COURSES

(FULL TIME COURSES APPROVED BY THE BUSINESS & TECHNICIAN
EDUCATION COUNCIL)

2 YEAR

BTEC National Diploma (OND)

ELECTRONIC &

COMMUNICATIONS ENGINEERING

(Electronics, Computing, Television, Video, Testing & Fault Diagnosis)

15 MONTHS

BTEC National Certificate (ONC)

ELECTRONIC EQUIPMENT

SERVICING

(Electronics, Television, Video Cassette Recorders, CCTV, Testing & Fault Diagnosis)

15 MONTHS

BTEC National Certificate (ONC)

COMPUTING TECHNOLOGY

(Electronics, Computing Software/Hardware, Microelectronic Testing Methods)

9 MONTHS

BTEC Higher National Certificate

(HNC)

COMPUTING TECHNOLOGY &

ROBOTICS

(Microprocessor Based Systems, Fault Diagnosis, ATE, Robotics)

**THESE COURSES INCLUDE A HIGH PERCENTAGE OF COLLEGE
BASED PRACTICAL WORK TO ENHANCE FUTURE
EMPLOYMENT PROSPECTS**

**SHORTENED COURSES OF FROM 3 TO 6 MONTHS CAN BE
ARRANGED FOR APPLICANTS WITH PREVIOUS ELECTRONICS
KNOWLEDGE**

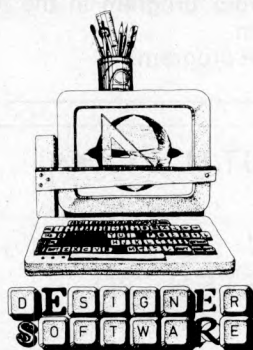
NEXT TWO SESSIONS COMMENCE ON

APRIL 22nd & SEPTEMBER 16th

'FULL PROSPECTUS FROM:

**LONDON ELECTRONICS
COLLEGE**

Dept PCW, 20 Penryn Road
London SW5 9SU. Tel: 01-373 8721



CAD SOFTWARE FOR THE BBC MICRO

Low-cost disk-based software for serious applications in design and education * Current prices: £34.95 to £99.95 — excellent value for professional design software * Continuous development and user support.

Details from:

IBBOTSONS DESIGN SOFTWARE

"The Byre", Ecclesbourne Lane, Ildridgehay,
Derbyshire DE4 4JB
Tel: 077 389 658

FIRST CLASS Learning Programmes for Education and Training FRENCH REVISION For 16+, 'O' Level and CSE

— first of a new series of computer assisted learning programs for the BBC model B and Electron.

Grade A — Agreement of the past participle, sentence structure and idiom.

Grade B — Comparative/superlative of adjectives/adverbs formation/use of perfect tense, emphatic/conjunctive pronouns.

Grade C — Partitive article, personal/relative pronouns, formation of future and pluperfect tenses, formation of imperative.

Grade D — Basic concepts of gender, number and agreement, formation of the present tense.

(Easiest level)

A Keyboard Introduction is included with each grade.

Students are required to complete carefully constructed sentences that contain relevant vocabulary for the 16+ examinations. Each grade has at least 4 hours revision for the average student.

Available on 40 or 80 track diskette or cassette.

Prices, including VAT, postage and packing:—

	Cassette	Diskette (40 or 80 track)
One grade	£9.95	£13.95
Any 2 grades	£18.95	£24.95
All 4 grades	£34.95	£39.95

Cheques/PO should be made payable to Dean Associates.

Allow 28 days for delivery.

DEAN ASSOCIATES, Provincial House, Solly Street, Sheffield S1 4BA

Tel: 0742 756666



COMPUTERS & TRAINING

O'LEVELS

not just revision but also tuition

MATHS 8 programs TOTAL 150k	Fractions, square roots, decimals, logarithms, areas, unit accuracy, linear, conic, volume, indices, standard form, modulus, number sets and charts, trigonometric, simultaneous equations, bar charts, averages, probability, algebraic laws, quadratic, matrices, vectors, transformational geometry, trigonometry, differentiation, integration, factors, angles.	Spectrum 48k BBC model B Commodore 64
PHYSICS 7 programs TOTAL 140k	Reflection, wavelength and frequency, refraction, lenses, the eye and its defects, diffraction, colour, magnetism, motors, Ohm's law, amps, volts, series, parallel, electronics, heat, gas laws, energy, light, specific heat, kinetic energy, half-life, atomic structure, radiation, isotopes, Newton's laws.	Spectrum 48k BBC model B Commodore 64
BIOLOGY 8 programs TOTAL 120k	Plant and animal cells, genetics, inheritance, reproduction in man, sexual and asexual reproduction, flowering plants, photosynthesis, enzymes, transportation, transport, bacteria, food chains, diet, immunity, cancer, respiration, excretion, eye, ear, nervous system, ecosystem, food cycles, lung, earthworm, amphibians, birds, mammals, response.	Spectrum 48k BBC model B Commodore 64
COMP. ST 7 programs TOTAL 140k	Data collection, coding, storage, processing, presentation, validation, d.p. systems, privacy, security, hardware, I/O devices, software, low and high level languages, machine code, assemblers, interpreters, compilers, errors in programming, aids to debugging, microcode, machine organisation.	Spectrum 48k BBC model B Commodore 64

each subject only £7.95 inc p/p

LOGO, FORTH PASCAL & C

Language 1 program Each 30k	Teaching versions of these languages, including a full text editor screen editor and a full page layout manager. Sorting and loading of programs is a screen editor function. Trace facilities are provided for easy tuition and debugging. Availability: Pascal now, C now, Logo now, Forth soon.	Spectrum 48k BBC model B Commodore 64
--------------------------------------	--	---

each language only £5.95 inc. p/p
GCE TUTORING DEPT.b

40 BRIMMERS HILL, WOMMER END, HIGH WYCOMBE, Bucks. HP15 8NP

(please send me: my name and address:

my computer is: I enclose a cheque / P.O. for £.....

OPEN HOUSE TUITION FOR NOVICES AND OTHERS

Choose your time — day or evening. Learn at your own pace.

BASIC programming £60

BUSINESS Packages £70

Word-Processing introduction £25

One week introduction for small businesses

Subject to MSC training grants £100

Brochure from:

MICROCOMPUTER ADVISORY CENTRE

Polytechnic of the
South Bank

Borough Road

London SE1 0AA

or ring:

01-928 8989 ext. 2468

MICROTEACH

Glasgow's first independent Micro training centre. Computer Programming Course.

The course is designed for people who want to keep abreast of the computer age, for anyone who realises that understanding computers is a key to future success, at BUSINESS, at SCHOOL, and as a PARENT.

The course provides an understanding of micro computer hardware, software and peripherals. Whether your interest lies in graphics, education or business, the course teaches you the use of BASIC language programming to produce your own programmes on your micro computer.

Enrol now for the Microteach BASIC course and teach your micro how to be useful.

Parent/child learn together special rate.

CONTACT:

MICROTEACH
205 Buchanan Street, Glasgow
Telephone: 041-332 0666

Expert tuition for micro users

Dissatisfied with your original training?
New people need teaching?
Need a refresher course?

Our London based education centre provides first class training facilities from the most basic through to the most advanced needs. We even provide on-site training at our clients premises. Government departments and private companies have benefited from our computer training courses.

We know how to help you get the most from any micro computer. Write today for full information on the courses available. Contact: The Courses Secretary, Computer Training and Education Centre, Fleet House, 8-12 New Bridge Street, London EC4 Tel: 01-583 2322

Scheduled Courses
A Getting started with your Microcomputer
B MS-DOS Operator level
C MS-DOS Operator level
D PC DOS Operator level
E Introduction to dBase II
F Programming in dBase II
G Framework
H Lotus 1, 2, 3
I Multimate
J Supercalc
K Symphony
L Wordstar
M Assembler Z80/8080
N Assembler 8086
O Basic
P Advanced Basic
Q Programming in C
R Pascal
S On site training



Please send me details of the courses indicated

A B C D E F G H I J K L M N O P Q R S

Name _____ Position _____ BSE 11
Company _____
Address _____ Tel. No. _____

COMPUTING BASIC & COBOL

Full time, part time or evenings
**NEW COURSES from April, July or
September 1985**

C&G "953" or "747", IDPM; Word Processing (Wordstar); and other courses. Fees from £190

We also run: Secretarial, GCE 'O' & 'A' Levels, Business Studies and English Language courses

Tel: 01-584 9097/7580

DAVID GAME Tutorial College

86 Old Brompton Road
London SW7

Telex: 296253 STAMCO G



112 BRENT STREET, HENDON, NW4

Tel: 01-202 2272/3/4

Telex: 265871 MONREF G

HELPS PLOT YOUR FUTURE!

Easy parking at rear car park
Nearest tube: Hendon Central
(Northern Line)



OPEN MON-FRI 9.00 - 5.30
SAT 9.30 - 5.00

BUSINESS COMPUTERS -
ALL PRICES OF BUSINESS
MICROS ARE SUBJECT TO VAT @ 15%



IBM AUTHORISED DEALER
- IBM PC

IBM PC PORTABLE£ please call
IBM PC£ please call
IBM XT£ please call
PC NETWORKING£ please call



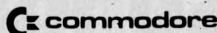
ACT APRICOT AUTHORISED DEALER

NEW F1 Computer Colour 256K RAM From 795.00
NEW Portable Computer Flat Screen 720K Cordless KB
Cordless Mouse Speech Recognition From 1695
Apricot PC Computer Twin S/S Disks 256K 1595
Apricot PC Computer Twin D/S Disks 256K 1795
Apricot Xi Computer 10Mb Hard Disk 2795
NEW Apricot Point 7 as Xi 10Mb and networks 6 additional Apricots
3795
NEW Apricot Point 32 10Mb File Server Networking up to 32 users
£2995
NEW Apricot point 32 as above but with 20Mb Hard Disk 4395
Apricot 9" High Res Monitor 200
Apricot 12" High Res Monitor 300
NEW Apricot 10" Colour Monitor 395
NEW Colour card for your Apricot PC or Xi 295



ACT SIRIUS AUTHORISED DEALER

Sirius 1.2 128K 2195
Sirius 2.4 256K 2895
Sirius SX 10mb 256k 3995
Sirius Network Please Call



COMMODORE

CBM 8296 SK 795
CBM 8050 895
CBM 8250 895



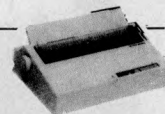
MATRIX PRINTERS

Brother EP44 Typewriter/Printer 220
Epson RX80T 245
Epson RX80FT 265
Epson FX80FT 345
Epson RX100FT 450
Epson FX100FT 475
Epson LQ1500 1100
Printer Buffers from 129



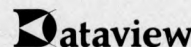
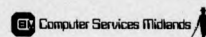
DAISY WHEEL PRINTERS

New Daisy Step 2000 18cps, Qume Compatible 285
Brother CE60 typewriter/Printer 13cps 410
Brother HR15 15cps 445
Brother HR25 25cps 795
NEW Ricoh 1200 22 cps 595
Ricoth Flowriter RP1300 37cps 1245
Ricoth Flowriter RP1600 60cps 1635



SOFTWARE

Pegasus Full Accounts Suite (per module) 295
Sales Ledger Payroll Purchase Ledger
Stock Control Nominal Ledger Job Costing
Invoicing & Sales Order Processing 295
Superwriter 295
Wordstar 295
Mailmerge 95
Wordcraft (Inc. Mailmerge & Dictionary) 425
Lotus 123 £ please call
Symphony £ please call
Open Access £ please call
Supercalc 195
Multiplan 195
Dbase II 395
DMS Delta 495
CSM Incomplete Records (Auditman) 1500
IBIS Incomplete Records (Accounts Prep) 1600
IBIS Time Recording 800
IBIS Bureau Payroll 600
Micromail (Telecom Gold) 95
Special Applications Software £ please call



WORDCRAFT

ACCESSORIES

Floppy Disks
Continuous
Stationery
Daisy Wheels
Printer Ribbons
Dust Covers
Disk Storage
Boxes
Disk Cleaning Kits
Battery Backup
Units
Tractor Feeds
Auto Sheet
Feeders
Acoustic Hoods
Computer & Printer
Stands
Cables

Interfaces
Winchester Hard
Disks
Modems
Monitors
Ram Cards
Other

SERVICES

Installation & Training
Software Maintenance
Hardware
Maintenance
Free Demonstrations
Consultancy
After Sales Support
Lease HP or Credit
Cards
Government Contracts
Export Orders



Official Tenders
Educational Discounts
Mail Order
Open 6 Days a Week

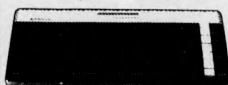
Please call for latest second-hand and ex-demo computers and printers

**- FREE GAME WITH EVERY COMPUTER WHILE
STOCKS LAST**

HOME COMPUTERS

ATARI

Atari 600XL 99.99
Atari 800XL 199.99
1050 Disk Drive 199.99
1010 Cassette 49.99



BBC

BBC Model B 389.00
BBC Model B + DFS 469.00
Disk Drives from 130.00
Cassette Units from 25.00
Acorn Electron 179.99



COMMODORE AUTHORISED DEALER

CBM 64 179.00
1541 Disk Drive 199.00
(+ free software)
CBM SX64 Portable £ please call
(+ free software)
CBM Cassette 44.95
CBM 801 Printer £ please call
CBM Colour Monitor 199.00
CBM BPS1101 £ please call



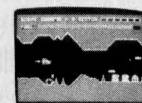
SINCLAIR

Spectrum 16K 99.95
Spectrum 48K 119.00
Alphacom 32 Printer 69.95



Also, full range of accessories:

Joysticks
Over 1000 Games
Educational
Programs
Printers
Speech
Synthesizers
Word Processing
Data Base
Programs
Spreadsheet
Programs
Sales, Purchase &
Stock Control
Monitors
Computer Desks
Light Rifles
Interfaces
Cables
Disk Drives
Cassette
Recorders
Over 500 Books



We are part of the
Spectrum Dealer Group

We are now Torch/Unicorn Dealers
for North London
Torch Z80 Disc Pack £ call

KNOWLEDGE IS POWER

FRANCIS BACON
1561-1626

We sell software to
Purchase our featured software
and receive **FREE** training
worth up to £350.

We'll teach you to realise the full power of the personal computer.

The Executive Computer Centre is a place of learning. Here are experts, who have prepared a range of executive courses designed to increase your knowledge in all aspects of personal computing.

They will show you how to get the most out of today's personal computers. They will inform you, instruct you, and motivate you. You will be given hands-on experience — one IBM PC for each delegate. You will be presented with carefully researched and considered advice, in a businesslike atmosphere.

The Executive Computer Centre runs courses in these software packages, using IBM PCs: Lotus, Symphony, Framework, Multiplan, Wordstar, Syncro, Visicalc, Volkswriter, XChange, Smart, DBase II, DBase III, Cardbox and Delta.

There are also courses using Apple, Apricot, Sperry, Olivetti and other hardware. The Executive Computer Centre is the best equipped, fully independent microcomputer training centre in London.

The Executive Computer Centre

24-25 New Bond Street,
London W1Y 9HD
Telephone: 01-629 9255

Choose from our selected courses or send for more details of our very special software prices.

- ☐ Please send me your full course list
- ☐ Please telephone me to discuss my training needs
- ☐ Please reserve me _____ places on the course(s) indicated
- ☐ Lotus 1-2-3 £350: March 11 – March 13
- ☐ Smart Database £250: March 19 – March 20
- ☐ Smart Advanced £150: March 26
- ☐ Lotus 1-2-3 Advanced £150: March 27
- ☐ Introduction to Micros £130: March 29
- ☐ DBase II £250: April 9 – April 10
- ☐ Psion XChange Archive £130: April 11
- ☐ Please send me your software price list and details of your free training offer worth up to £350

Name: _____

Position: _____

Company: _____

Address: _____

Telephone No: _____

The Executive Computer Centre, MAM House,
24-25 New Bond Street, London W1Y 9HD.

P3

***How to get superb
quality printing
for your IBM PC
without paying
over the top.***



Qume's SPRINT 11 PLUS is the smartest choice in a letter-quality printer for your IBM PC. It's made by one of the world's largest suppliers of daisy-wheel printers, it offers the highest reliability in the industry, and its print quality is second to none. All this, for SUBSTANTIALLY LESS COST than any printer in its class. The SPRINT 11 PLUS plugs right into your PC, prints at 40, 60 or 90 cps – equivalent to a minimum of 360 words per minute – and works beautifully with your IBM PC business software, including sophisticated

word processing packages. So don't take chances on a low-performance printer. And don't spend more than you need to. Choose the dependable, premium-quality SPRINT 11 PLUS. It's the best printer you can buy for your IBM PC. And the best buy in printers. For full details on the SPRINT 11 PLUS, contact ISG on the Hot Line now!

Prices are exclusive of VAT.

Qume[UK]
AUTHORISED
DISTRIBUTOR
& SERVICE AGENT

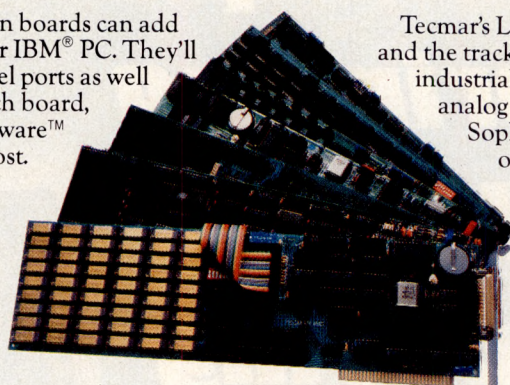
isg
Data Sales Ltd

Wellington Industrial Estate, Basingstoke Road,
Spencers Wood, Reading, Berks RG7 1AW
Tel: (0734) 884666 Telex: 849110

Sales Hot Line: Reading (0734) 884866

Branch office: Elmdon House, 2291 Coventry Road,
Sheldon, Birmingham B26 3PS. Tel: 021-742 4431.

Our Captain™ or other multifunction boards can add up to 384 K bytes of memory to your IBM® PC. They'll give you additional serial and parallel ports as well as a built-in clock/calendar. With each board, you'll get our Treasure Chest of Software™ (24 programmes in all) at no extra cost.



For your graphics needs, Tecmar offers the Graphics Master™. With it, your PC gets graphics support for most popular software packages like 1-2-3™ from Lotus,™ Open Access,™ AutoCAD,™ and all IBM colour software. Graphics Master works in high resolution: colour (640 x 400) or monochrome (720 x 700).



PERIPHERAL VISION

When your computer needs peripherals, it pays to go with the company that has the peripherals and the vision. Tecmar.

In all, Tecmar has more than 150 peripherals and add-ons for your computer. So, when you're ready to expand, ask for Tecmar. Contact one of our authorized distributors listed below. Or write for our brochure.

Tecmar International Inc., 181 Chaussée de la Hulpe, 1170 Brussels, Belgium, Tel. (02) 672.23.98, Telex 20256.

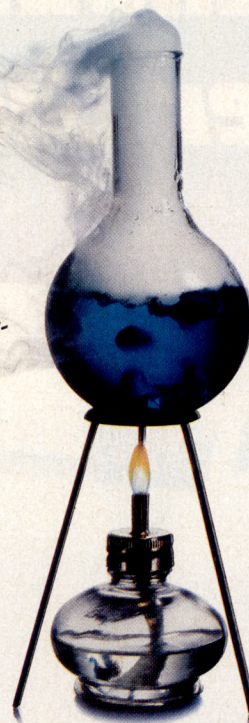
TECMAR

MAKES THE BEST PC'S EVEN BETTER.

For large memory storage, Tecmar offers your PC a variety of Hard Disk Drives with capacities up to 74 megabytes.

These include Removable Disk Drives for unlimited hard disk storage.

And Tecmar also makes the MacDrive,™ Removable or Fixed Hard Disk Drive for Macintosh™ computers.



IBM is a registered trademark of International Business Machines.
1-2-3™ and Lotus™ are trademarks of Lotus Development.
Macintosh is a registered trademark of Apple Computer Inc.

FIRST SOFTWARE LTD.

Intec 1 - Wade Road - Basingstoke RG24 0NE - Hants - England. Telephone (0256) 463.344 - Telex 848927 REFLEX
ELECTROPLAN LTD.

Orchard Road, P.O. Box 19 - SG8 5HH - Royston, Herts - England. Telephone (0763) 411.71 - Telex 81337 ECPLAN G



Softlife

NUMERIC KEYPAD

for the

BBC MICRO

Any BBC user will be aware that entering numeric data on the BBC keyboard, whether for business, educational or scientific purposes, is a slow and inefficient process. The Softlife Numeric Keypad changes all that. Speedy entry of numeric data is now possible — as on many more expensive computers.

Features

- ★ N-Key rollover
- ★ Only connection to user port
- ★ High quality keys
- ★ Hand held, or free standing
- ★ Software provided on eprom
- ★ Simple selection command
- ★ Standard mode uses no user RAM — optional fully programmable mode also available
- ★ Maximum software compatibility

Also available

Softlife's much acclaimed EPROM PROGRAMMER ("I'd buy one" — Acorn User) with software on Eprom and documentation — £56 + £1 p&p + VAT. 2764 Eprom (250 ns) — £6.50 + 50p + VAT. 27128 Eprom (250 ns) — £17.25 + 50p + VAT. UV Eprom eraser — £19.95 + £1 + VAT. User port extension — £9 + 75p + VAT. 1MHz Bus extension — £11 + 75p + VAT.

All products and data available from:

SOFTLIFE LTD
7 Rose Crescent, Cambridge CB2 3LL
Tel: (0223) 62117



£59
+ £1.25 p&p
+ VAT

MIRAGE

unleashes the power of the

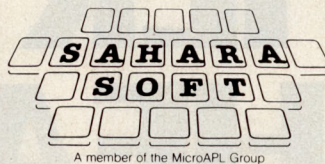
PINNACLE

MIRAGE — the professional multi-user operating system for the 68000

Comprehensive range of languages:

BASIC APL.68000

ISO-PASCAL FULL ANSI-77
FORTRAN



A member of the MicroAPI Group

Sahara Software Limited

Unit 1F

Tideway Industrial Estate

87 Kirtling Street

London SW8 5BP

Telephone: 01-627 1733

Friendly Face

MICRODRIVE/CARTRIDGE UTILITIES

A complete suite of new routines

LOAD, CATALOG, ERASE cartridge files, by menu choices from master, autorun routine. Intelligent FORMAT routine formats batches of cartridges for optimum storage space. Print Filespace or CATALOG or Duplicate Master Routine on batches of cartridges. Also — Expert Microdrive Troubleshooter!

THE ONLY UTILITY OF ITS KIND

Now with fully updated Microdrive routines to MERGE with Masterfile and Tasword Two, and give optimum professional performance.

MEMO and ACTION (scheduler) formats for MASTERFILE are free with cartridge version

INCREDIBLE VALUE from MONITOR Ltd.
Cartridge £12.95, Cassette £6.95, incl. VAT and P&P within U.K. or P&P within Europe.

P.O. Box 442, London NW7 2JF. 01-959-1787.

ADVANCED INPUT DEVICES (UK) LTD

BUSINESS SERVICES DIVISION

DISCOUNT SOFTWARE...

SAVE UP TO 40% ON RRP

phone for quote or write for price list - most popular business packages available.

Appointed Dealers for:

EASY Junior ACCOUNTING SOFTWARE. FULLY INTEGRATED ACCOUNTS PACKAGE FEATURING SALES, PURCHASE & NOMINAL LEDGERS. STOCK CONTROL, SALES INVOICING, WORD PROCESSOR, LABEL PRINTING. SINGLE ENTRY - ALL MODULES LINKED. RRP £395 plus VAT. Call for special package deal including installation!!!

UNICOM RAP FROM UIS. THE HOST SOFTWARE USED BY TELECOM GOLD. NOW AVAILABLE FOR A VARIETY OF MICROS. OFFERS ERROR FREE COMMUNICATIONS, MICRO TO MICRO, MICRO TO HOST, ETC. MAKE FULL USE OF ALL THE VALUE ADDED FEATURES OF TELECOM GOLD. RRP £145 plus VAT. Special package deal for RAP, Modem and Telecom Gold MAILBOX. CALL FOR DETAILS and literature!!!

MAINS SUPPLY PROBLEMS?

Distributors for RAYMAN ELECTRONICS

(trade & end users supplied)

UPS A COMPLETE RANGE OF UNINTERRUPTABLE POWER SUPPLIES UP TO 2KW. ALL UK MANUFACTURED - UNIQUE EXCHANGE WARRANTY - A MUST FOR ALL BUSINESS COMPUTERS. RME120 (suitable for basic IBM PC) RRP £375 + VAT. RME250 (for XT) RRP £680 + VAT. RME500 (for larger Hard Disc systems) RRP £742 + VAT. Full details on request.

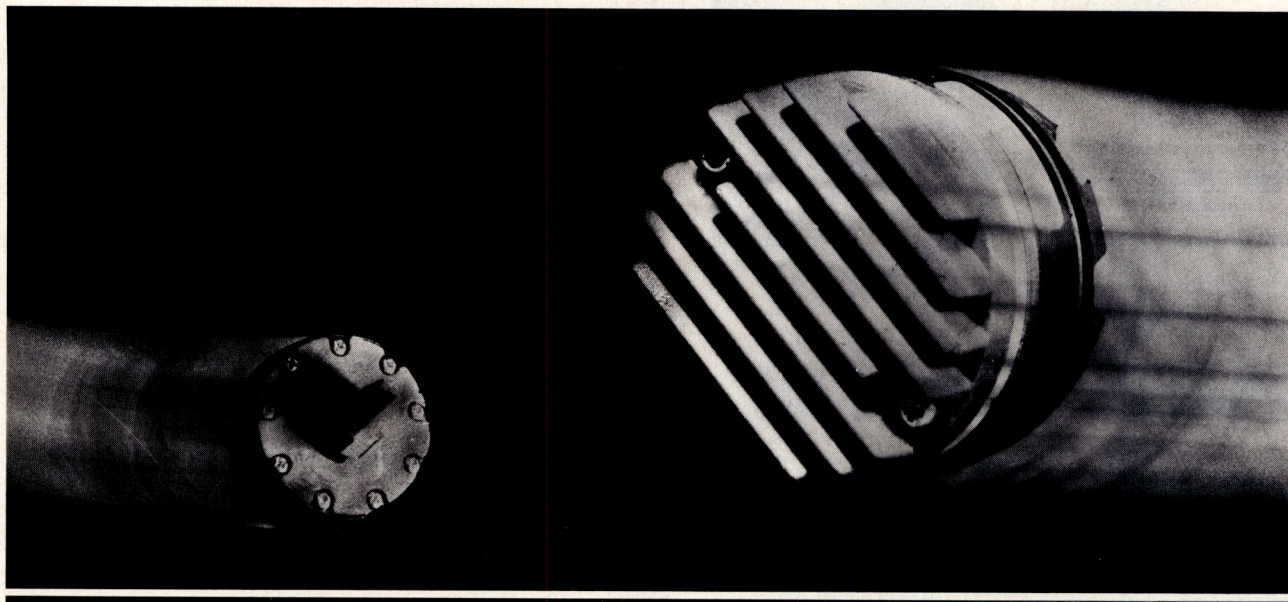
CLAMP & POWER BLOC for individual equipment - protect against surges and spikes from the mains supply. CLAMP (full 10A rating) RRP £16.90 + VAT replaces 13A plug. POWER BLOC takes 4 13A plugs to enable all equipment to be supplied from 1 13A socket. RRP £29.99 + VAT.

For further information, call:

01.429 2675 (24 hours)

or write (no stamp required) to:

ADVANCED INPUT DEVICES (UK) Ltd. FREEPOST, Pinner, Middx. HA5 2BR.



EITHER AN OKI OR HEADS WILL ROLL.

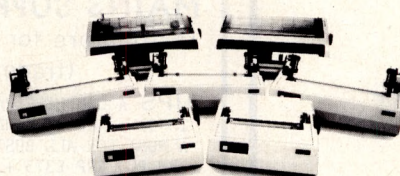
OKI IS O.K.

Imagine a head that can print 500 million characters – 1/4 million A4 pages – without falling over. Imagine an OKI 2410.

500 million characters of needle sharp quality – the OKI 2410 is the No. 1 professional standard for heavy duty applications.

It's the clearest proof of the superiority of OKI performance. Performance based on high quality and reliability, so that while other printers are falling down, OKI printers continue to give you print perfection. Perfection built in by OKI's robotic production assembly line. The robots themselves are OKI designers and characterise the futuristic thinking of the com-

OKI



X-DATA

THE NAME BEHIND
THE PRODUCTS IN FRONT

X-DATA Ltd. 750/751 Deal Avenue
Slough Trading Estate Berks SL1 4SH
Tel. Slough, (0753) 72331 · Tlx. 847728

pany. All OKI printers, including the best selling MICROLINE range, are designed and built the same way, ensuring that from the least expensive to the top of the range, OKI quality and reliability is constant throughout.

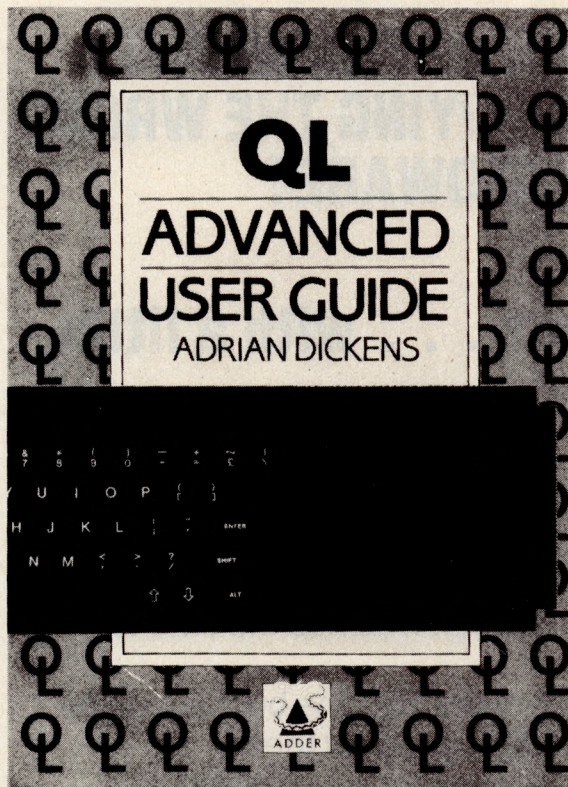
Don't forget, no-one's head has ever rolled for buying OKI printers . . .

So now that you'd like to know more about the OKI printer range, contact us at the address below and we'll send you the information you need. Better still, why not see an OKI printer in the flesh. Call in and see your local approved dealer now – otherwise heads will roll . . .

THE ASSEMBLER

The ADDER 68K Assembler is a professional, fully integrated editor/MACRO assembler development package for the QL. Providing a quick turn-around on the *editing, assembling, debugging* cycle, it assembles Motorola format source files to produce multi-tasking programs, additional Super BASIC facilities plus much more. Features include:

- * FULL 68000 MACRO Assembler
- * Integrated full screen editor
- * Conditional assembly
- * External library file inclusion
- * Complete error checking diagnostics
- * Comprehensive manual
- * MACRO ASSEMBLER only £29.95*



THE BOOK

The QL Advanced User Guide (£12.95*) has been written by Adrian Dickens in collaboration with Tony Tebby (QDOS System designer). It is the complete guide to QDOS and the Sinclair QL, covering multi-tasking, transient programs, resident procedures, heaps and stacks, traps and utilities, 68008 assembler programming plus much more. All of these features are illustrated by practical examples, and the powerful QDOS experimenter program allows many facilities to be tried out from BASIC. All of the programs from the book are available on a microdrive cartridge which can be purchased with the book (£9.95*).

ORDER FORM

- ☐ Assembler development package **£34.95** incl. VAT and p&p
☐ QL Advanced User Guide Book **£14.45** incl. p&p (no VAT)
☐ QL A.U.G. programs from book **£11.95** incl. VAT and p&p
☐ **SPECIAL OFFER**

All three items from above (normally £61.35) **£55.95** ALL inclusive

I enclose cheque/PO for £

Name

Address

City Postcode

Send to: **ADDER PUBLISHING LIMITED,**
P.O. Box 148, Cambridge CB1 2EQ

Dealer enquiries welcome

QL and QDOS are trademarks of Sinclair Research Limited

* Price excluding VAT and p&p



SANYO 550 Series

Memory Upgrades 64k (128-192k)	49	Graphic Specials:	
128k (128-256k)	90	(Graffiti: Freeze Frame: Joystick)	85
Disk Upgrades 2x360k Internal	315	(Picasso: Freeze Frame: Joystick)	118
(All inc. Software) 2x800k Internal	355	BASIC manual (inc. Post & Pack)	27
(All inc. Software) 2x800k External	429	ADS Joystick (2 Button)	25
10mb Internal Hard Disk	995	Logitek Screen Handler (Ansi 3.64)	15
MS-DOS 2.11	39	Screen Dump (Freeze Frame)	32
Games/business		Select — Datastar: Report/Label Pgm	25
Send for List			
Coming Soon — IBM (Lotus) Board — Clock/Calendar Card			

IBM PC

10mb Internal Hard Disk	890	Memory Upgrades 64k RAM	55
Hard Disk Power Supply (Optional)	145	128k RAM	99
2x10mb Int Hard Disk & Pow Supply	1595	AST Six Pack Plus Multifunction Card	
SMART Integ Pack (WP: S' Sheet: D' base)	635	(RAM: Serial: Parallel: Clock)	
AutoCAD (Draft/Design Package)	800	AST with 64k RAM	275
smARTWORK (PCB Design Package)	895	AST with 384k RAM (Huge Saving)	495
Coming Soon — AT Compatible Drives (ie 1.2 mb)			

TURBO PASCAL (IBM, Sanyo, Olivetti etc)

Turbo Pascal	49	{ Turbo Gift Pack }	All 3 — Save £28	99	
Turbo Toolbox (Isam, Quicksort etc)	49				
Turbo Tutor	29				
Sidekick (IBM & Full Compat Only)	49				
		Turbo Pascal (With 8087 Support)			89

DESMET 'C' COMPILER

Compiler & Full 8086 Assembler	135	Symbolic Debugger	50
--------------------------------	-----	-------------------	----

51/4" FLOPPY DISKS — BASF or 3M

Single Sided: Double Density (per 10)	16	Double Sided: Double Density (per 10)	16
Single Sided: Double Density (per 50)	70	Double Sided: double Density (per 50)	99

All prices plus VAT at 15%

Manufacturers Guarantees

Send cheque with order to:

NORTH WEST COMPUTER SUPPLIES

19 Green Pastures, Stockport, Cheshire SK4 3RB

Tel: (061) 432 2952 or (0606) 781164

Callers by appointment ONLY



Postage & Packing Included

3D COMPUTERS

THE HOME COMPUTER SPECIALISTS

BBC 'B' + DFS **£529**

with 100K disk drive

BBC 'B' **£349**

Plus 5 software packs

SINCLAIR QL **£349**

COMMODORE 64 **£234**

with cassette recorder

ACORNELECTRON **£149**

with 5 software packs

ACORNELECTRON **£129**

QL 14" MONITOR **£175**

SINCLAIR QL **£519**

with monitor

FRIENDLY ADVICE & SERVICE AT EVERY BRANCH

230 TOLWORTH RISE SOUTH, SURBITON **01-337 4317**

30 STATION ROAD, BELMONT, SUTTON **01-642 2534**

114 GUNNERSBURY AVE, EALING **01-992 5855**

26 STANLEY ROAD, NEWBURY **(0635) 30047**

1 MANOR ROAD, CADDINGTON, LUTON **(0582) 458575**



£1000 instant credit



LOOKING FOR SOFTWARE?

**DID YOU KNOW THE BUSINESS COMMUNITY
WASTED £700M LAST YEAR BUYING THE WRONG
SOFTWARE AND HARDWARE?**

**This year could be different . . . with a little
imagination.**

- You will need a library full of information on software with full details on commercial and professional software for mainframes, minis and micros.
- It would help to have your own personal assistant who has the time to research and knows where to look.
Then you simply instruct them to produce a shortlist of the best available software and arrange demonstrations for you to preview them.
- Wouldn't it be nice if this service was completely free and available to you as often as you need it?
- Someone used their imagination last year and produced such a service. It's called:

SOFTWARE INFORMATION LIMITED

All you need to do is phone with your requirement and your personal assistant does the rest. They can be contacted on:



831 0071



ACORN ELECTRON WITH **FREE** COMPANION EXPANSION UNIT



The Companion Expansion is a rugged aluminium case that bolts firmly onto the back of the Electron. It contains a six slot mother board with three connectors installed that can be used to expand your Electron to a more complete system.

BUY AN
ACORN ELECTRON
FROM US, AND
GET A
FREE
COMPANION
EXPANSION
UNIT

Acorn Electron	£173.00 + VAT
Companion Exp. Unit	£29.00 + VAT
Printer & User Port	£19.90 + VAT
Sideways ROM Board	£19.90 + VAT
Joystick Board	£12.90 + VAT
Prototyping Board	£9.90 + VAT
Boards in Development	
Disk Interface	
Memory Expansion	
Relay Board	
Serial Communications Board	
Econet Interface	

APPLE MACINTOSH

"If you can point, you can use a Macintosh."

- 68000 Processor
- 128K RAM
- Built-in 400K Disk
- Macwrite
- Macpaint
- Built-in high resolution screen

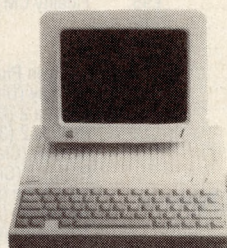


MAC £1590 + VAT

MAC & Imagewriter £1890 + VAT

APPLE 2c

- 128K RAM
- Built-in Disk Drive
- 80 Column Display



Apple 2c £799 + VAT

2c Monitor £129 + VAT

Additional Drive £199 + VAT

Monitor Stand £27 + VAT

Epson RX80FT £259 + VAT

PACKAGE DEAL £1299 + VAT

ACT APRICOT

APRICOT PC
FROM £1199 + VAT

APRICOT Xi
FROM £2199 + VAT



All Apricots come with MS-DOS, Basic, Supercalc, Superplanner, Superwriter.

APPLE



Apple 2e £489 + VAT

Drive with controller £199 + VAT

Additional Drive £159 + VAT

80 Col Card £79 + VAT

Printer Interface £79 + VAT

Epson RX80FT £259 + VAT

Philips Monitor £79 + VAT

EVERGREEN
APPLE

PACKAGE DEAL £1299 + VAT

SANYO STOCK CLEARANCE

500 £649 + VAT

555 £849 + VAT

COMP SHOP PRICE PROMISE

— We guarantee to match the price on equipment offered from stock through any other supplier.

Educational enquiries and orders welcome.

Quotations given.

One year warranty on all products.



COMP SHOP was established in 1978 and has continually offered the best in micro computers to discerning customers.

We sell only computers and peripherals, and therefore can offer the support many other shops cannot.

All prices quoted are exclusive of VAT. Delivery is added at cost. Please make cheques and postal orders payable to COMP SHOP LTD., or phone your order quoting BARCLAYCARD, ACCESS, DINERS CLUB or AMERICAN EXPRESS number.



14 Station Road, New Barnet, Hertfordshire, EN5 1QW
(Close to New Barnet BR Station - Moorgate Line)

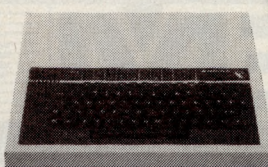
Telephone: 01-441 2922 (Sales) 01-449 6596 Telex: 298755 TELCOM G
OPEN (BARNET) - 10am - 7pm - Monday to Saturday

ACORN BBC

SPECIAL OFFER

• BBC B + 8 Program Tapes £347 + VAT

• BBC + Disk Interface + Disk Drive £499 + VAT



- BBC + Disk Interface + Disk Drive
- + Juki 6100 Printer
- + Leads
- + High Res Monitor
- + Workwise W.P.

£949 + VAT

THOUGHTS & CROSSES

37 MARKET STREET, HECKMONDWIKE, WEST YORKS

Telephone: 0924 402337

COMPUTERS

BBC B	£399
BBC B DFS	£469
Electron	£189
Spectrum 48K (free software worth £57)	£125
Spectrum Plus (free software worth £60)	£175
Memotech 512	£265
Commodore 64	£189
Apple IIe with Disk Drives 2 & Controller	£985
Amstrad (Green screen) + £100 free s/w	£239
Amstrad (colour) + £100 free s/w	£349

PRINTERS

Canon PW1080A	£315
Canon PW1080A plus QL Int	£355
Canon PW1156A	£425
Epson RX80	£269
Epson RX80FT	£299
Epson FX80	£389
Epson FX100	£520
Juki 6100	£370
Brother EP44	£235
Brother HR5	£155
Commodore 1520	£95
Commodore MPS801	£210
Alphacom 32	£69
CCP 40	£119
Shinwa CPA80 (Centronics)	£215
Shinwa CPA80 RS232	£236
Shinwa CP80 (Centronics)	£199
Daisy Step 2000	£250

Opus and Cumana Disk Drives available. Phone for latest price

DISKS

Wabash	
S/S S/D 40 Track	10 for £17
D/S S/D 40 Track	10 for £20
D/S D/D 40 Track	10 for £22
D/S D/D 80 Track	10 for £28

Dysan Disks

104/1D S/S D/D 40T	10 for £20
104/2D D/S D/D 40T	10 for £29
204/2D D/S D/D 80T	10 for £35
3" Maxell, Single	£4.50
3 1/2" Hewlett Packard, Single	£4.50

Further discounts for quantity
50 + 10% discount
100 + 15% discount

MONITORS

Microvitec 1431 MS (Std)	£199
Microvitec 1451 MS (Med)	£290
Microvitec 1431 MZ (Spectrum)	£245
Microvitec 1451 QL	£275
Philips 7502 green anti-glare (20mHz)	£78
Commodore 1701	£210
Fidelity TV Monitor	£210
Fidelity CM14 Monitor	£189

BBC

Electron Plus 1 (Acorn)	£55
The Key (Disk) (Clares)	£11.50
Replica 2 (Disk) (Clares)	£10.50
Replica 2 (3" disk) (Clares)	£13
Grafkey (Clares)	£8
Grafdisk (Clares)	£11.50
Beta-Base (Disk) (Clares)	£22
Beta-Base (3" disk) (Clares)	£22
Wordwise (Comp Concepts)	£40

Disk Doctor (Comp Concepts)	£30
Gremlin (Comp Concepts)	£30
Caretaker (Comp Concepts)	£32
Acorn Speech Rom (Acorn)	£54
View (Acorn)	£55

RIBBONS

Epson MX/FX/RX80	£6
Epson MX/FX100	£8
Seikosha GP	£4.50
Microline	£2.30
MPS 801	£6.50
NEC 8023	£7
Canon	£11
Epson 100 Refill	£3.30
Mannesmann Tally MT80	£6.50
Juki 6100 S/S	£2
Juki 6100 M/S	£5

INTERFACES

QL — Centronics	£40
Canon RS232	£80
Epson RS232	£29
Epson RS232 with 2K Buffer	£65
Juki RS232	£60
Kempston Rom — Spectrum Centronics	£50
Kempston Tape — Spectrum Centronics	£38
Trippler Centronics — Commodore	£50
IFEE — Epson Centronics	£70
IFEE — Epson plus 2K Centronics	£75

COMMODORE PERIPHERALS

Koala Pad (Cassette & Disk)	£75
Koala Pad Cartridge	£85
Word Craft Cartridge	£85
Simons Basic	£45
Programmers Utilities (Disk)	£12.50



For Access & Visa orders ring 0924 409753

All prices include VAT and delivery



OEM FIRST for EPSON and OKI MICROLINE PRINTERS

EPSON

SHEER ELEGANCE

	List Price £	OEM Price £
RX 80		
100 CPS 80 Col	279	209
RX 80 F/T		
100 CPS 80 Col	319	229
RX 100 F/T		
100 CPS 136 Col	450	349
FX 80		
160 CPS 80 Col	438	339
FX100		
160 CPS 136 Col	569	449

OKI MICROLINE

M82A	SHEER MAGIC
120CPS 80 Col	299 259

M92P

	List Price £	OEM Price £
160CPS 80 Col	449	379
M92S		
160CPS 80 Col	539	459
M83A		
120CPS 136 Col	489	419
M84P		
200CPS 136 Col	799	679
M84S		
200CPS 136 Col	899	769
M93P		
160CPS 136 Col	585	499
M93S		
160CPS 136 Col	675	579
P — Parallel Interface, S — Serial Interface, A — Both supplied as std.		

BARGAINS

	List Price £	OEM Price £
SHEER VALUE		
SHINWA CTICP80	299	199
JUKI Daisywheel	449	349
SEIKOSHA GP100A	215	199
OLIVETTI		
JP101 Ink Jet	199	159
DAISYSTEP		
Daisywheel	288	249

PRICING

OEM Prices are exclusive of carriage and VAT and are current at time of printing.
CARRIAGE ONLY £5 ON ALL ITEMS

ALWAYS CALL FOR OUR BEST PRICES ON OTHER LEADING PRODUCTS



HOW TO ORDER

By phone, quoting your ACCESS or BARCLAYCARD number or by sending a cheque for the OEM price stated, plus carriage and VAT. Please allow 7 days for cheque clearance. 30 days credit for Official Orders from PLC's and Public Authorities, subject to 5% Credit Charge.



TELEPHONE HOTLINE
(0788) 70522/3/4

OEM Computer Sales
9-11 Regent Street
Rugby
Warwickshire CV21 2PE

**We start carrying
your workload
the very first day.**



EasyWriter II™ System

EasyWriter II System is word processing that's easy to learn and easy to use. Memos, reports, correspondence, even statistical documents are letter perfect from day one. If you can type, you can use it to lighten your workload.

EasyWriter II System gives you everything you need. It has an 88,000 word spell checker and convenient mail-merge for reports and form

letters. They're built right in, not sold separately. And unlike some other programs you may see, what you look at on the screen is exactly what is printed.

So no matter what your office word processing needs, EasyWriter II System can make the days more productive, by carrying the load right from the start.



**SORCIM/IUS
MICRO SOFTWARE**

A Division of Computer Associates International, Inc.

Easy Software working harder.

Special offer: Free demo diskette

☐ Please send me a Free Demo Diskette* so I can preview the features and effectiveness of EasyWriter II™ System

Name

Address

Tel:

Post this coupon to:

**Sorcim/IUS, 16-20 High St, Maidenhead,
Berks, SL6 1QH. Tel: 0628 70911**

*Diskette is designed for use with IBM-PC® or fully compatible hardware systems.
IBM-PC is a registered trademark of International Business Machines Corporation.

PCW 3

Sorcim/IUS Products: EasyWriter 1 System, EasyWriter II System, SuperWriter, SuperCalc 3 Rel.2,
and other SuperCalc Software, EasyFiler, and EasySales Pro.

PCW249

THE FIRST 64K COMPUTER FOR ONLY £129!

ATARI XL

THE NEW ATARI 64K 800XL £129

EVERYTHING YOU WANT FROM A HOME COMPUTER

1. ATARI 64K 800XL - £129: The Atari 800XL has many facilities and includes such advanced specifications that you will be amazed by its performance. At the new reduced price of only £129 inc VAT for a full specification 64K computer with a proper full stroke keyboard, we believe that the 800XL cannot be beaten. Compare Atari with the competition, just look at these specifications:-

COLOUR CAPABILITIES: 16 colours and 16 intensities giving 256 different colours (all of the 256 colours can be displayed at the same time).

OPERATING SYSTEM: 24K ROM including Atari Basic programming language and a self diagnostic test program.

KEYBOARD: Full stroke design with 62 keys including help key and 4 special function keys, international character set and 29 graphics keys.

SOUND: 4 independent sound synthesisers each capable of producing music across a 3½ octave range or a wide variety of special sound effects. (Additional programming can achieve an octave range of up to nine octaves!)

DISPLAY: 11 graphic modes and 5 text modes. Up to 320x192 resolution. Maximum text display 24 lines by 40 columns.

SPECIAL ATARI INTEGRATED CIRCUITS: GTIA for graphics display. Pokey for sound and controller ports. Antic for screen control and I/O (Input/Output).

CPU: 6502C microprocessor - 0.50 microsecond cycle and a clock speed of 1.79 MHz.

EXTENDED GRAPHICS FUNCTIONS: High resolution graphics. Multi-coloured character set. Software screen switching. Multiple redefined character sets. Player missile (sprite) graphics. Fine screen scrolling. Changeable colour registers. Smooth character movement. Simple colour animation facilities.

PROGRAMMING FEATURES: Built in Atari Basic programming language supporting peek, poke and USR plus at least 8 other languages available. The help key will provide additional information and menu screens with certain software. Full on-screen editing is available as well as syntax checking on entry.

INPUT/OUTPUT: External processor bus for expansion with memory and peripherals. Composite video monitor output. Peripheral port for direct connection to Atari standard peripherals. Software cartridge slot is included as well as 2 joystick controller ports.

SOFTWARE: Over 1,500 items of software are available including self teaching programs with unique voice over. The range of programs includes Education, Home Management & Programming aids. There is also APX (Atari Program Exchange) and of course Atari's famous entertainment software now at only £9.95. In addition there is a host of support and help available from specialist Atari magazines like Antic and Analog and from over 75 Atari books/manuals.

2. ATARI 400 16K GAMES MACHINE - £29: We have several Atari 400 games consoles/computers with 16K RAM. The price is £29 (for a reconditioned model) or £39 for a new machine. Both come with 12 months guarantee. The Atari 400 can play all 800XL ROM cartridge games and is expandable up to 48K RAM. Computer upgrade with Basic Programming Kit (£30) optional extra.

3. ATARI 1010 PROGRAM RECORDER - £34: For low cost storage and retrieval capability. Data transmission 600 baud. Storage capability 100K bytes on a sixty minute cassette. Track configuration four track, two channels (digital and audio). Auto record/playback/pause control/unique soundthrough facility. Built in accidental erasure prevention, automatic shutoff and 3 digit tape counter.

4. ATARI 1050 DUAL DENSITY DISK DRIVE - £199: 5¼" disks holding 127K randomly accessible bytes provide both expansion and flexibility for your 400/800 or XL system with new 'helpful' DOS 3. All customers who purchase a Disk Drive from Silica Shop will be automatically given a FREE set of 100 programs on 3 Disks recorded on both sides.

5. ATARI 1020 COLOUR PRINTER - £99: Printer and Plotter with four colour graphic print capability. 40 column width printing at 10 characters per second. Can print 5, 10 and 20 characters per inch. 64 character sizes. Prints text in 4 directions. Choice of line types.

6. ATARI 1027 LETTER QUALITY PRINTER - £249: For word processing letters in professional type. Print speed of 20 chars per second.

7. ATARI TOUCH TABLET - £49: Enables you to draw and paint pictures on your T.V. screen, with the touch of a stylus.

8. ATARI TRAK BALL CONTROLLER - £19.95: Enables cursor movement in any direction and adds arcade realism to your games.

9. ATARI SUPER CONTROLLER - £9.95: The ultimate joystick with double fire button to give you a greater competitive edge in your games.

SILICA SHOP ARE THE No1 ATARI SPECIALIST

Silica Shop are now firmly established as the No 1 Atari retail/mail order and wholesale specialist in the U.K. We already offer our service to over 120,000 customers, 10,000 of whom have purchased Atari Home Computers. Because we specialise (and with a turnover of £1.5 million), we are able to keep prices low by bulk purchases. Ring one of our 45 staff and we will be glad to be of service to you. Complete the coupon below and we will send you our Atari pack with our 16 page price list and XL colour catalogue.

EXTENDED TWO YEAR GUARANTEE: We are an Atari Service Centre, able to service and repair Atari equipment and have added a 12 month guarantee to the year offered by Atari, giving you a full 2 year guarantee on your new XL computer.

SPECIALIST SUPPORT: Our technical staff are always available on the telephone to help and advise you. We endeavour to hold stocks of every Atari compatible item available in the U.K. and we stock over 75 Atari books and manuals.

AFTER SALES SERVICE: When you purchase your equipment from Silica, your name will be automatically added to our mailing list. You will then receive price lists, newsletters and details of new releases and developments, as well as special offers which are exclusive to Silica Atari Computer Owners.

LOW PRICES: Our prices include VAT and are extremely competitive. We will normally match any lower price offered by our competitors.

FREE COMPUTER OWNERS CLUB: This is open to all Atari computer owners irrespective of where you purchased your equipment. Membership is FREE and entitles you to receive bulletins giving details of new releases and developments. Send now for your FREE information pack, price list & colour catalogue.

PAYMENT: We accept cash, cheques, postal orders and all Credit Cards. We also offer credit facilities over 1, 2 or 3 years, please write for a written quotation.

NEXT DAY DELIVERY - FREE: All goods despatched from Silica Shop are normally sent by first class post or parcel post FREE OF CHARGE. As a special introductory offer for a limited period only we will be sending all Computers and Disk Drives by a next day Securicor delivery service at our own expense.

So fill in the coupon below with a literature enquiry or order and begin to experience a specialist Atari service that is second to none.

SILICA SHOP LTD, 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX Tel: 01-309 1111

ORDER NOW-OR SEND FOR A FREE COLOUR BROCHURE

To: SILICA SHOP LTD, Dept PCW 0385, 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX Telephone: 01-309 1111

LITERATURE REQUEST:

☐ Please send me your FREE colour brochures and 16 page price list on Atari Computers.

☐ I own a Videogame ☐ I own a Computer

Mr/Mrs/Ms: Initials: Surname:

Address:

Postcode:

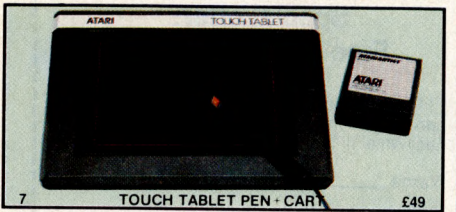
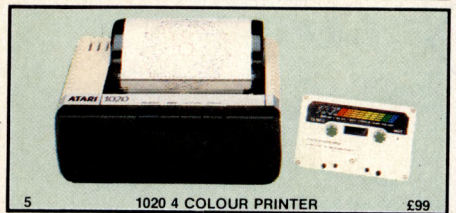
ORDER REQUEST:

☐ PLEASE SEND ME:	
☐ 800XL 64K Computer	£129
☐ 400 16K Games Machine	£29/£39
☐ 1010 Program Recorder	£34
☐ 1050 127K Disk Drive	£199
☐ 1020 4 Colour Printer	£99
☐ Letter Quality Printer	£249
☐ Touch Tablet + Cartridge	£49
☐ Trak Ball	£19.95
☐ Super Controller	£9.95

ALL PRICES QUOTED ARE INCLUSIVE OF VAT - POSTAGE & PACKING IS FREE OF CHARGE

☐ I enclose Cheque/P.O. payable to Silica Shop Limited for the following amount £.....

☐ CREDIT CARD - Please debit my:
Access/Barclaycard/Visa/American Express/Diners Club Card Number



NEW HORIZONS

**8 ASHBURNHAM ROAD
BEDFORD
MK40 1DS**

TEL: 0234 53816

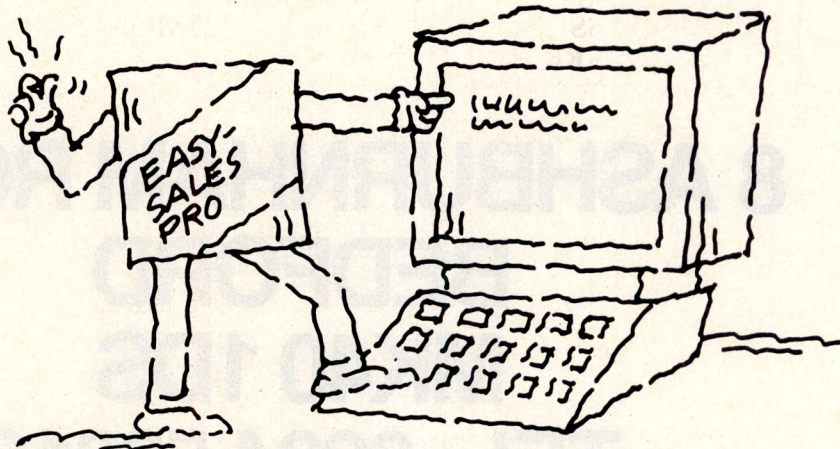
**TELEX: A2392 ROBINSa6
HARD DISCS PLUS CONTROLLER 10,20,40 MEGABYTE
FOR OLIVETTI M24 PLUS IBM COMPATIBLE
DEALER ENQUIRIES WELCOME
EXPORT ENQUIRIES WELCOME**

AGENT BUYERS

Currently under contract to supply 3 million pounds worth of business for 1985. We like to be contact from worldwide parallel importers of personal computers. We can offer the best price from UK distributors. Assistance on hardware if required. Technical support if required. Maximum reservation to all customers.

**IMPORT and EXPORT
COMPUTERS**

EasySales Pro™ picks your best prospects instantly.



EasySales Pro™

The more accurately you pick your best sales prospects, the more time you save. Your sales force spends more time selling, less time figuring out who to sell to.

EasySales Pro is a personal computer program that can dramatically increase the efficiency of your sales efforts. In one easy-to-learn program, EasySales Pro sets up sales call priorities by ranking the importance of your prospects. It shows you how much time should be spent with them, and how often to call.

Just tell EasySales Pro about your customers and prospects. The pro-

gram guides you to better sales decisions.

EasySales Pro is designed to be adaptable to a wide variety of sales management systems, so you can easily customize it to your product line. And EasySales Pro can generate timely reports on territory activity, as well as in-depth records of prospects. This makes it a snap to update your sales and prospect information.

Pick your best prospects... before your competitors do. Pick up EasySales Pro at any Sorcim/IUS dealer.



SORCIM/IUS
MICRO SOFTWARE

A Division of Computer Associates International, Inc.

Easy Software working harder.

Special offer: Free demo diskette

☐ Please send me a Free Demo Diskette* so I can preview the features and effectiveness of EasySales Pro.™

Name

Address

Tel:

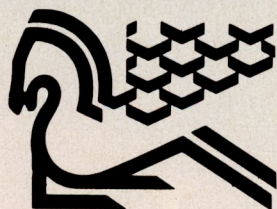
Post this coupon to:

Sorcim/IUS, 16-20 High St, Maidenhead,
Berks, SL6 1QH. Tel: 0628 70911

*Diskette is designed for use with IBM-PC® or fully compatible hardware systems.
IBM-PC is a registered trademark of International Business Machines Corporation.

*** CUT PRICE MICROS ***

P
L
U
S



**PEGASUS
BUSINESS
SOFTWARE**

APRICOT MICROCOMPUTERS

ACT Xi 10 MEG £(VERY LOW!!)
ACT Xi 5 MEG £(EVEN LOWER!!)
ACT 2x720K £(LOWER THAN MAYFAIR)
ACT 2x315K £(LOW-LO-LO)
12" MONITORS AVAILABLE

THE PEGASUS SYSTEMS

SYSTEM 1

APRICOT WITH 2 x 720K PLUS 12" MONITOR
PLUS SUPERWRITER WORDPROCESSING PROGRAM
PLUS SUPERCALC FINANCIAL FORECASTING PROGRAM
PLUS SUPERPLANNER ELECTRONIC DIARY AND
CARDBOX SYSTEM
PLUS PEGASUS SALES ORDER PROCESSING/INVOICING
PLUS PEGASUS SALES LEDGER
PLUS PEGASUS PURCHASE LEDGER
PLUS PEGASUS NOMINAL LEDGER
PLUS DATA CABLE TO LINK PRINTER TO COMPUTER
PLUS 20 3.5" DISKS
PLUS BROTHER HR15 DAISY WHEEL QUALITY PRINTER
SYSTEM PRICE £2796.00

SYSTEM 2

APRICOT WITH 10 MEGABYTE HARD DISK DRIVE AND
12" MONITOR
WITH SUPERWRITER FOR WORD PROCESSING
WITH SUPERCALC FINANCIAL FORECASTING
SPREADSHEET
WITH SUPERPLANNER ELECTRONIC DIARY SYSTEM
PLUS EPSON FX80 PRINTER
PLUS DATA CABLE TO LINK PRINTER TO COMPUTER
PLUS 10 3.5" DISKS
PLUS 1 BOX OF FANFOLD PAPER
PLUS ANY 4 MODULES OF PEGASUS ACCOUNTING
SOFTWARE
SYSTEM PRICE £3596.00

WE CAN
RECONFIGURE ANY
PACKAGE TO SUIT
YOUR INDIVIDUAL
NEEDS. WE PROVIDE
HOT-LINE SUPPORT,
SERVICE, DATA
INSURANCE & ON-
SITE MAINTENANCE

THE APRICOT SYSTEMS

APRICOT Xi 10 MEG
SUPERWRITER
SUPERCALC
SUPER PLANNER
BASIC/MS-DOS/CPM-86
FX100 PRINTER & CABLE
BOX OF DISKS
BOX OF PAPER
£2800

APRICOT 2x720
12" MONITOR
SUPERWRITER
SUPERCALC
SUPER PLANNER
ANY PRINTER
WORTH UP TO £400
£1996

SOFTWARE – UP TO 30% DISCOUNTS

WORDSTAR
FRIDAY
DBASE II
OPEN ACCESS

CARDBOX
DBASE III
AUTOCODE
LOTUS 1-2-3

SYMPHONY
TOUCH & GO TYPING TUTOR
SUPERCALC III

SUPERCALC II
MULTIPLAN
FRAMEWORK

OUR FULL SOFTWARE RANGE IS FAR TOO LARGE TO INCLUDE HERE PLEASE
CALL US FOR CURRENT PRICES ON ANY SOFTWARE PRODUCT

ALL ITEMS ARE FULLY SUPPORTED AND GUARANTEED. CALL NOW FOR FREE
ADVICE FROM OUR APPLICATIONS EXPERT. TRAINING IS ALSO AVAILABLE ON
ANY PROGRAM OR COMPUTER.

WE OFFER FREE TRAINING WITH ANY TOTAL SYSTEM BOUGHT TO US. OUR
SYSTEMS ARE SOLD ON A INSTALLED AND WORKING BASIS. WE CAN DELIVER
TO ANY PART OF THE U.K. OR COURIER TO ANY TRADING COUNTRY IN THE
WORLD.

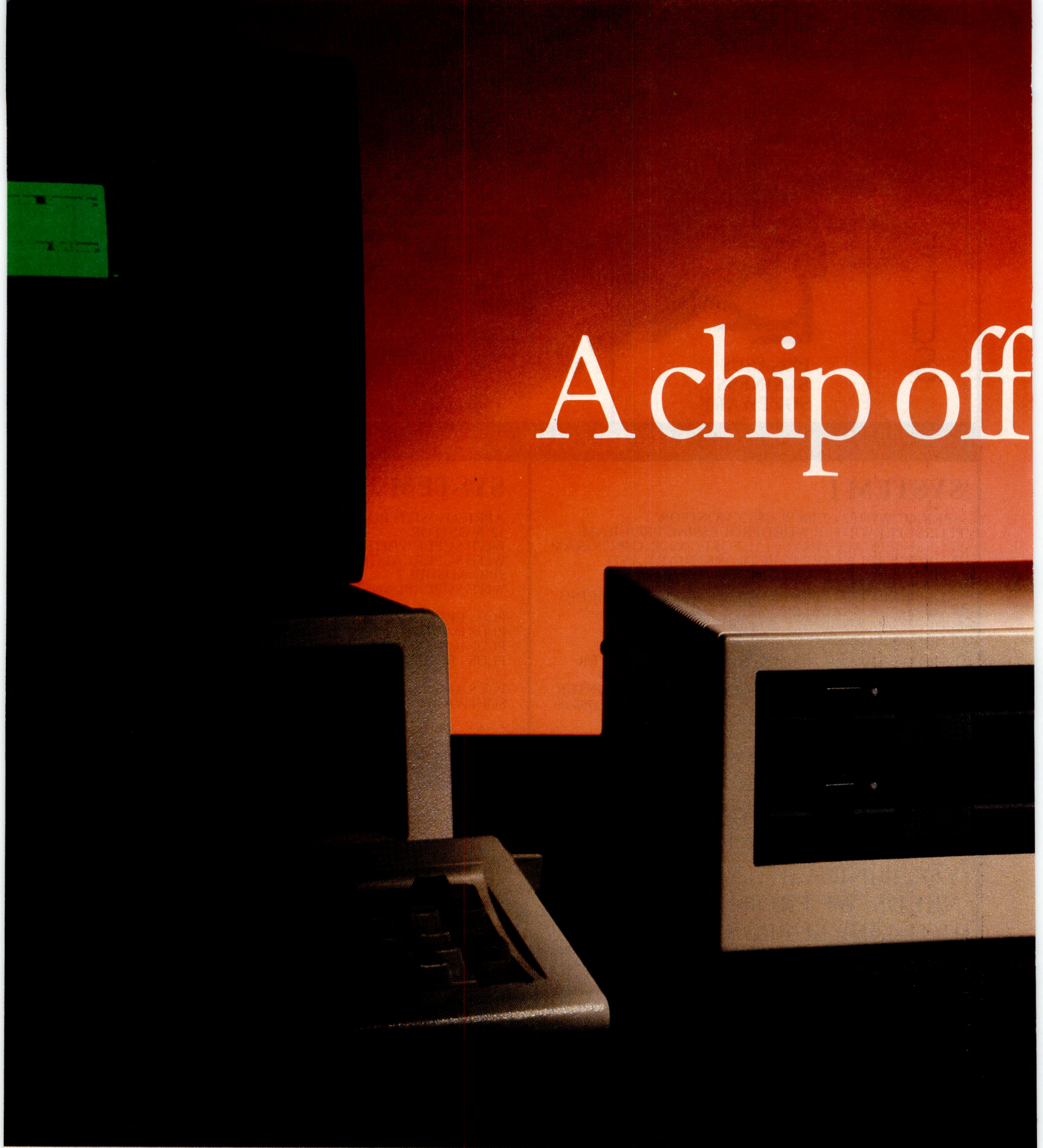
BUY RENT OR LEASE
FROM THE PROFESSIONALS



We are authorised dealers for the above

TEL: 01-800 8182
78-82 KIRKTON ROAD
LONDON N15

MCS



A chip off

The chip, of course, is the 8088 as used in the IBM[®] PC. The operating system is customised to MS[™]-DOS compatibility. The user memory is 256K RAM, that's four times as much as big brother. The floppy disc storage is 720 Kbytes, that's more than

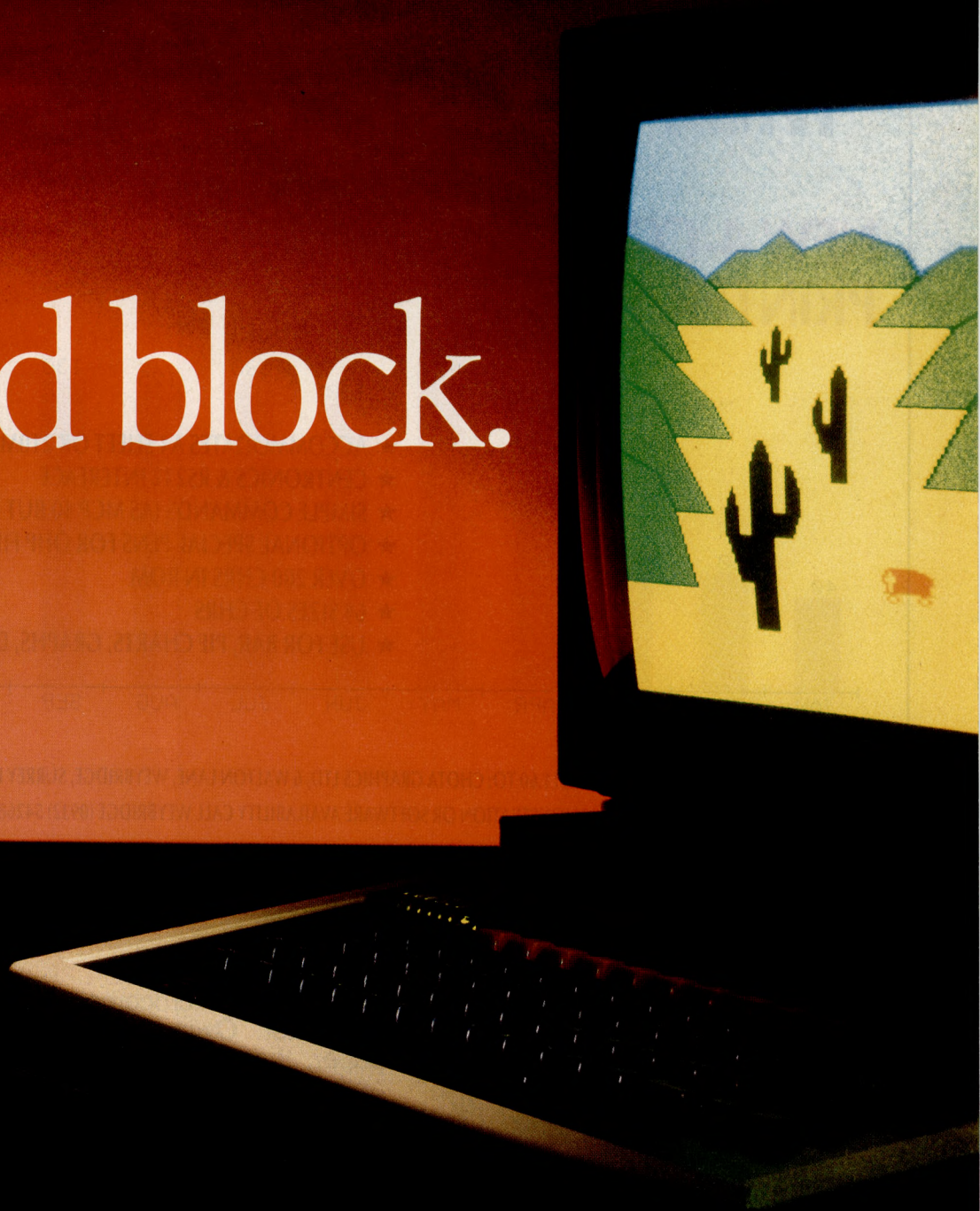
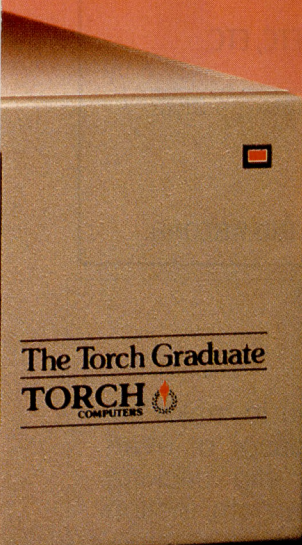
double the basic PC. We've only got two expansion slots, but there again we use them for expansion and don't need to tie them up with basics such as colour graphics or printer ports.

We are disc compatible to Lotus 1-2-3 and most other popular business

software. And hardware compatible, accepting auto-dial/auto-answer internally housed modems, networking and memory expansion cards, plotters and just about any board level product developed for the IBM[®] PC.

And at £1,087, including VAT and a suite of PSION

the old block.



XCHANGE business software to get you started, we're less than half the price.

Isn't it a shame we're only available to BBC Model B Micro owners.

Torch Computers, dedicated to the BBC Micro in more ways than one.

For the name of your local Torch Graduate dealer complete the reader enquiry card or ring (0223) 841000.

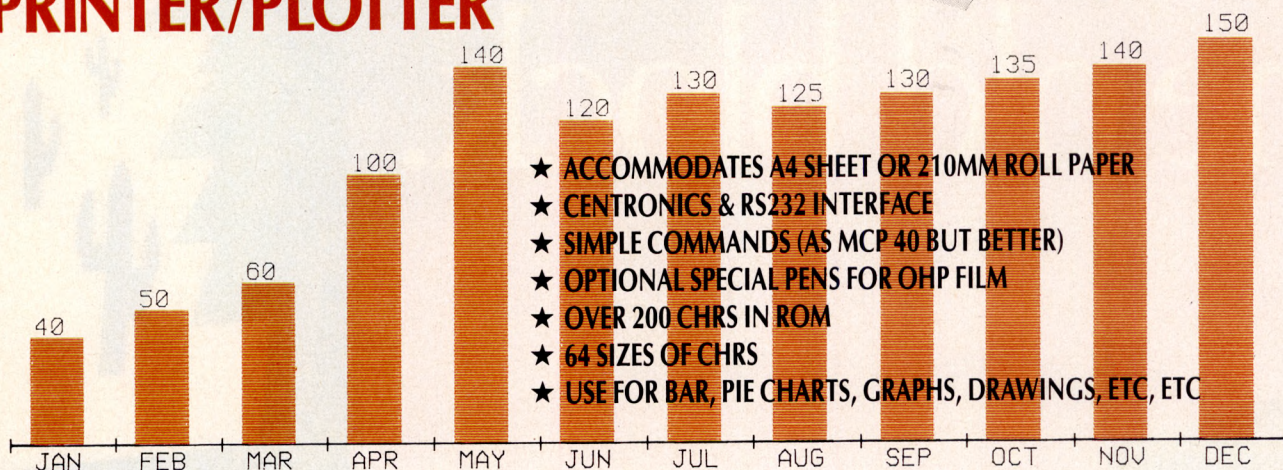
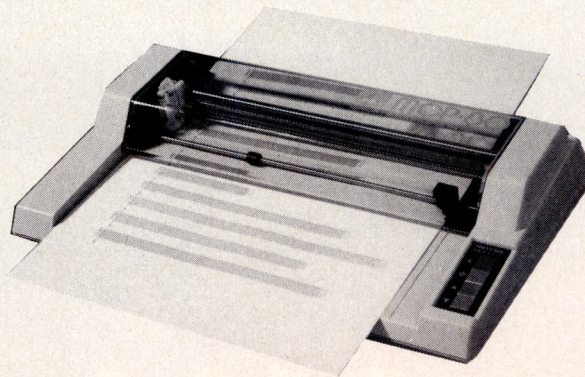
Torch Computers Ltd., Abberley House, Great Shelford, Cambridge CB2 5LQ.

Torch Graduate
TORCH
COMPUTERS

Technical Specification • 8088 16-bit CPU (5Mhz) • 256K RAM • MS™-DOS operating system customised to IBM PC compatibility • Twin double sided, 5 1/4" floppy disc drives (each 360K formatted) • 2 IBM PC compatible expansion slots • Free PSION XCHANGE software (Abacus, Easel, Archive, Quill) • Software compatibility allows Lotus 1-2-3 and all popular IBM PC business programs to run without modification, subject to constraints of BBC keyboard and display • Acorn Disc interface is not required • Keyboard, text and graphics by BBC Model B Micro.

MCP-80

NEW 4-COLOUR PRINTER/PLOTTER

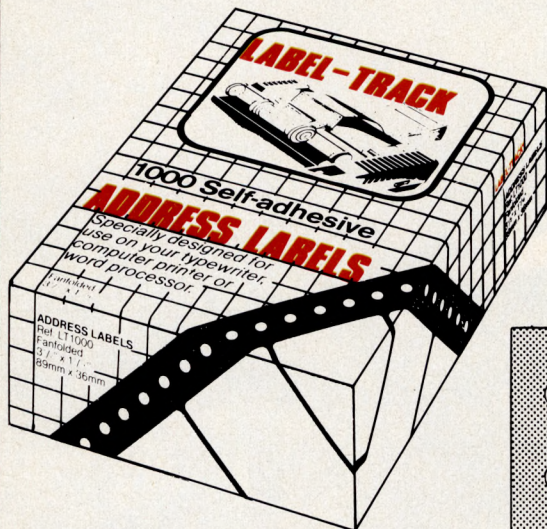


- ★ ACCOMMODATES A4 SHEET OR 210MM ROLL PAPER
- ★ CENTRONICS & RS232 INTERFACE
- ★ SIMPLE COMMANDS (AS MCP 40 BUT BETTER)
- ★ OPTIONAL SPECIAL PENS FOR OHP FILM
- ★ OVER 200 CHRS IN ROM
- ★ 64 SIZES OF CHRS
- ★ USE FOR BAR, PIE CHARTS, GRAPHS, DRAWINGS, ETC, ETC

£179.00 EXC VAT & P&P

FOR DELIVERY SEND A CHEQUE FOR £211.60 TO: CHOTA GRAPHICS LTD, 6 WALTON LANE, WEYBRIDGE, SURREY KT13 8NF

FOR FURTHER INFORMATION OR DEMONSTRATION OR SOFTWARE AVAILABILITY CALL WEYBRIDGE (0932) 54268 (DEALER ENQUIRIES WELCOME)



**EACH BOX CONTAINS
1000 FAN FOLDED
SELF-ADHESIVE LABELS**

All purpose **ADDRESS LABELS** help you to make full use of your microcomputer, word processor or even typewriter. Owing to their special low slip backing paper, these labels are ideally suited to both friction and traction feeders.



ORDER FORM

SEND TO SARLEE LTD, FELSTEAD STREET, HACKNEY, LONDON E9 3DP

No. of boxes @ £5.95 per box (Inclusive of Postage & Packing and VAT) _____

I enclose cheque for £ _____

Tick if VAT invoice is required ☐

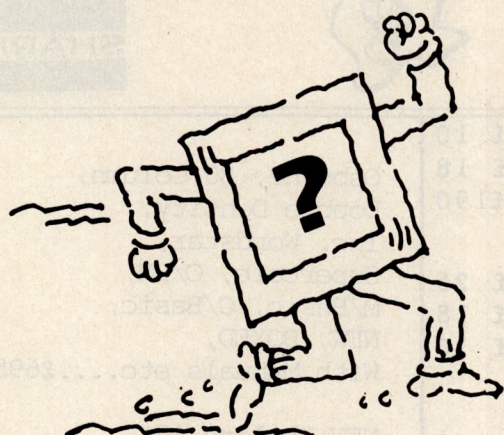
NAME: _____

COMPANY: _____

ADDRESS: _____

POST CODE: _____

SIGNATURE: _____



**The fastest
spreadsheet is
understandably
better.**

SuperCalc® 3, Release 2

SuperCalc 3 with FastMath™ is faster than any other competitive spreadsheet. A lot faster. This means while you're waiting for others to calculate, you could be off and running with SuperCalc 3, Release 2. And on top of its astonishing speed, it's all on one disc to simplify usage. We've simplified the price, too. It's about **£80** lower than its best known rival.

SuperCalc 3, Release 2 provides the broadest range of functional capabilities. You get a better data manager, and the

most sophisticated graphics of any integrated program. Your spreadsheets will be more meaningful, more understandable.

Yet it's surprisingly easy to learn and use. From easy startup, to extensive tutorials, to deeper, more efficient modelling, the more you get into SuperCalc 3, Release 2, the better it treats you.

Speed, flexibility, depth... no wonder it takes you further, faster.



**SORCIM/IUS
MICRO SOFTWARE**

A Division of Computer Associates International, Inc.

Easy Software working harder.

Sorcim/IUS Products: EasyWriter 1 System, EasyWriter II System, SuperWriter, SuperCalc 3 Rel 2, and other SuperCalc Software, EasyFiler, and EasySales Pro.

Special offer: Free demo diskette

☐ Please send me a Free Demo Diskette* so I can preview the features and effectiveness of SuperCalc® 3, Release 2.

Name

Address

Tel:

Post this coupon to:

**Sorcim/IUS, 16-20 High St, Maidenhead,
Berks, SL6 1QH. Tel: 0628 70911**

*Diskette is designed for use with IBM-PC® or fully compatible hardware systems.
IBM-PC is a registered trademark of International Business Machines Corporation

EPSON**BROTHER****SHARP****OSBORNE**S/H COMPUTER SALE !!!!!!!

Sanyo 555 & software	£600
H.P. 87 Computer	£495
H.P. 83 Computer	£295
TMK 320P	£350
Apricot pc 256K	£1200
Vic 20 NEW!!!	£35
Epson PX 8 NEW!!!	£695
Microvitec Cub	£140
Atari 600x1	£60
Casio PB700 & int	£90
3 Easy Pieces software for Apple 111	£90
Acorn Electron	£90
Uncased Olivetti 200k	
Disk Drives	£80
Seikosha GP700A	£160
Epson CX21 Acoustic Coupler	£140
H.P.12C	£50
H.P.11C	£50
Apple 111	£700
Memotech MTX 500	£95
Multiplan Apple 11	£60
Philips NEW 12"Green Screen Monitor	£85

Sharp	
MZ 80A Inc.	
Software	£170
Universal I/F	£ 25
Floppy Disk Card	£ 45
Floppy Disk Cable	£ 18
Disk Basic, Inc.	
Manual	£ 12

Printer I/F	£ 10
Printer Card	£ 18
P6 Printer	£190

SOFTWARE

Sharp F/DO S	£ 25
Sharp Assembler	£ 18
Sharp Mac. Lang.	£ 10
V.A.T. & Stock Control (each)	£ 5

Apple 2 Europlus	£
Apple 3	£750
Apple Disk Drive (Boxed)	£125
Apple Compatible Disk Drive from:	£ 75
Apple Easywriter	£ 15
Apple 3 Profile	£500
GENUINE Apple Cards	
Language Cards	£ 40
Pal Card	£ 40
Serial I/F	£ 45
Centronics I/F	£ 45

Non Apple	
Videx Card	£ 40
Eprom Card	£ 40
Z80 Card inc.soft	£ 55
U. H.F. Modulator	£ 25

SOFTWARE	
P.F. S. Report	£ 15
APPLE 3	
P.F. S File, c/w P.F. S. Rep.	£ 30
Pascal	£ 50
Mail List Manager	£ 35
Business Basic	£ 27

SYSTEMATICS SOFTWARE	
For Apple II&III (Bundled)	
RING FOR DETAILS	

Osborne, 80 Column,
Double Density,
Inc. Wordstar,
Supercalc, C/PM,
M/Basic, C/Basic,
NEW, BOXED,
With Manuals etc....£695.

NEW Philips 12"
Green Screen
Monitor, ideal
for 80 Column.....£ 85.

Osborne Software.

DataStar.....	
Supersort.....	
D Base 2.....	
Microlink.....	
Bstam.....	

PHONE!!!!

Atari	
Thermal Printer	£ 49
Epson PX8 Computer	£715
Epson HK 20	
Epson CX21 Acoustic Coupler	
HK Expansion	£ 80
704 Cable	£ 12
Intext (ROM)	£ 35
MX 100	£275
R S 232 I/Face	£ 45

T.I. ELECTRONIC	
Data Terminal	
Model 745	£500
Brother HRL	
Daisy Wheel Ex Demo	£295

All prices plus VAT

MORGAN CAMERA COMPANY

160, TOTTENHAM COURT ROAD, LONDON W.1. TEL:01-388-2562

The **XLtron** MEGA●BOX

£29

£50

With



— it's tough!



Measures 6 1/4" x 8 3/4" x 6 1/2"

The original and still the leader in value.

Prices
guaranteed
until 28th March.
1985

THE midi●box

15 DS/DD disks in our **midi●box** at a bargain price. Our new **midi●box** has some great features. It's made of high impact plastic and holds up to 30 5 1/4" disks, but is one of the neatest on the market. Measuring only 6" x 6" x 3", the rigid lid conveniently holds the disks you are working on ready to hand. And with 15 DS/DD disks its a bargain at only £20 plus £3 VAT and £2 p&p = £25.

Atari owners ring for 'flippies' prices



SUPERDISK

Suitable for any user, any computer, any format. Single sided, double sided, 48 or 96 tpi. Individually tested.



10 in a **mini●box** £19 plus VAT £2.85 and £2 p&p = £23.85

15 in a **midi●box** £25 plus VAT £3.75 and £2 p&p = £30.75

25 in a **MEGA●BOX** £42 plus VAT £6.30 and £2 p&p = £50.30

50 in a **MEGA●BOX** £80 plus VAT £12 and £2 p&p = £94.00

**Disco·Tech (U.K.) Ltd.,
Lex House, 3-6 Alfred Place,
London WC1, England.**

Disco·Tech (U.K.) LTD. are the
sole distributors of XLTRON.

XLtron

Floppy Disk Prices

All disks are 5 1/4", 48tpi,
featuring write protect
notch, centre hubs, double
and single density, Tyvex
sleeves and full set of labels.

25 SS/DD disks in **MEGA●BOX** £29 plus VAT
£4.35 and £2 p&p = £35.35

25 DS/DD disks in **MEGA●BOX** £39 plus VAT
£5.85 and £2 p&p = £46.85

50 SS/DD disks in **MEGA●BOX** £50 plus VAT
£7.50 and £2 p&p = £59.50

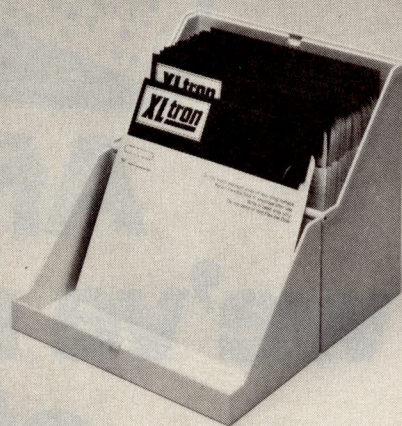
*50 DS/DD disks in **MEGA●BOX** £70 plus
VAT £10.50 and £2 p&p = £82.50*

10 SS/DD disks in **mini●box** £13 plus VAT
£1.95 and £2 p&p = £16.95

10 DS/DD disks in **mini●box** £18 plus VAT
£2.70 and £2 p&p = £22.70

*£5 price reduction

The MEGA BOX is a top quality rigid plastic
storage box with see-through lid and four dividers.
Holds up to 60 diskettes.



Suitable For Popular Micros

XLTRON disks are recommended for BBC, Atari
and Commodore computers. If you need advice on
other micros just ring 01.631 0255

Our Quality Promise

You can order with confidence. We buy disks from
international manufacturers to our specifications,
then test, retest and grade them in our London
laboratories.

Fully Guaranteed

The XLTRON quality control is so stringent that
we can give our famous 'two for one' guarantee. If
you find a faulty disk, return it to us, and we'll
send you two in exchange immediately. All part of
our five year guarantee.

© TYVEX is a registered name of Du Pont.
© RHINOKOTE is a registered name of Disco Technology Ltd.
© XLTRON is a registered name of Disco Technology Limited.

Personal Callers Very Welcome

We're now established in our new showroom in
Alfred Place. You can save our £2 delivery charge
by calling in - you'll be welcome weekdays from
10.00am till 5.00pm Saturday 10.00am-4.00pm.

Help Lines

Technical: 01.631 0255
Sales: 01.631 3600

If you want help or information to place an order
just ring our 'help' lines.

Official Orders

We accept orders from all government bodies,
schools, universities, libraries, armed forces etc.
We despatch on receipt of an official purchase
order. If you can't raise a cheque without an
invoice, just post or telephone your order and we'll
send you a pro-forma by return.

To: Disco·Tech Ltd., Lex House, 3-6 Alfred Place, London WC1, England

Just fill in the coupon or send your order on a postcard or letter. Or phone your order on 01.631 3600

Please send me the following, (tick the appropriate boxes):

_____ (QTY) ☐ SS/DD ☐ DS/DD ☐ SUPERDISK disks in a
☐ **MEGA●BOX** ☐ **midi●box** ☐ **mini●box**

I enclose a cheque/p.o. for £_____ or debit my Access/Diners/Amex card

card no. _____

Name: _____ Signature: _____

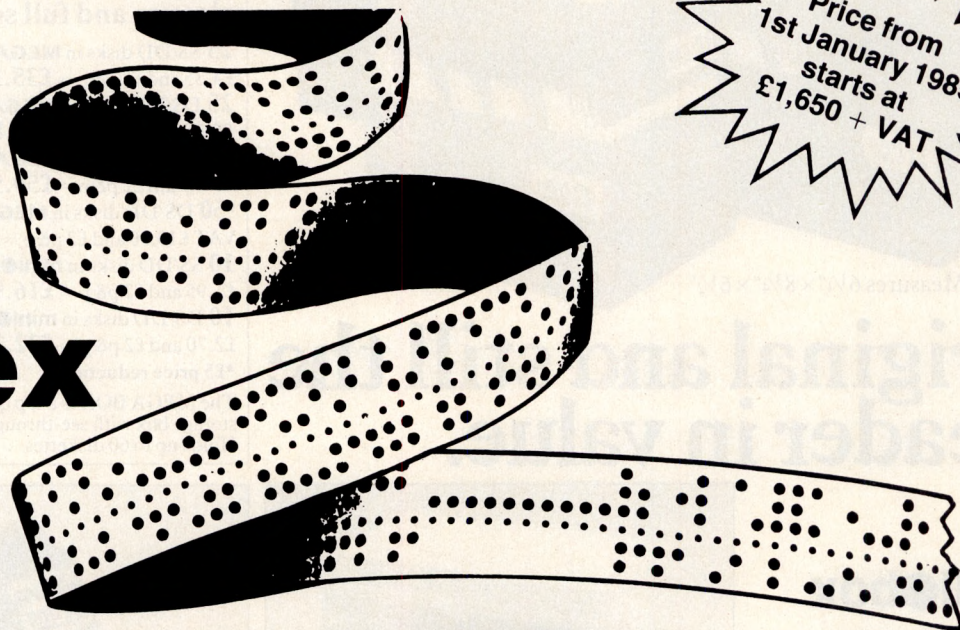
Address: _____

Postcode: _____

(Block Capitals Please)

PCW3

Telex



Price from
1st January 1985
starts at
£1,650 + VAT

After 83 years we've reached the end of the tape.

It's almost unbelievable that we still use punched paper tape to transmit important and imperative messages around the world.

But it doesn't take a great leap of the imagination to realise that by hooking up a normal micro computer to the British Telecom telex jack, we can have all the advantages of today's microchip technology.

No longer will you have to wait to receive or transmit while you're typing out another telex message.

You can alter the words directly on the VDU, and send the same

other jobs, and the noise level is just a whisper.

Storage on a floppy disc can be optionally selected, but if the disc is full (and it can take up to 20 telexes), all telexes are printed, thus reliability is assured.

When it's 9 o'clock in the morning in Dallas, your telex can go out when they're in the office and you can store incoming messages 'till you get in.

An inbuilt clock tells you how long each transmission has taken, and can then be attributed to any department.

The KAI Telex Processor is British Telecom approved, and with an Apple II or IIE you immediately have a quality micro computer and a telex at your disposal.



TELEX PROCESSOR

Telex us on 261514

Fill in the coupon and send to:
KAI Limited, 203a Belsize Road, London NW6. Tel: 01-625 5126.

Please ring me for a demonstration ☐
Please send me further information ☐

Name

Position

Company

Address

Tel. No.

APPROVED
for use with
telecommunication systems
run by British
Telecommunications
in accordance with the
conditions in the
instructions for use



telex to ten different destinations by pressing just one button.

Automatic dialling, redialling and storage of numbers, enable your operator to get on with

The KAI Telex Processor is fast, and has a prodigious memory, with extended form capability for variable information that can be added to customised forms such as invoices.

With software prices like this, Microware's hardware must be hard to pass up!

MULTI-USER PEGASUS - £295.00

- Sales Ledger
- Purchase Ledger
- Nominal Ledger
- Invoicing
- Order Processing
- Stock Control
- Payroll
- Job Costing

PROJECT MANAGEMENT

- Hornet - £2750.00
- Harvard - £395.00

NEW LOTUS SYMPHONY £495.00

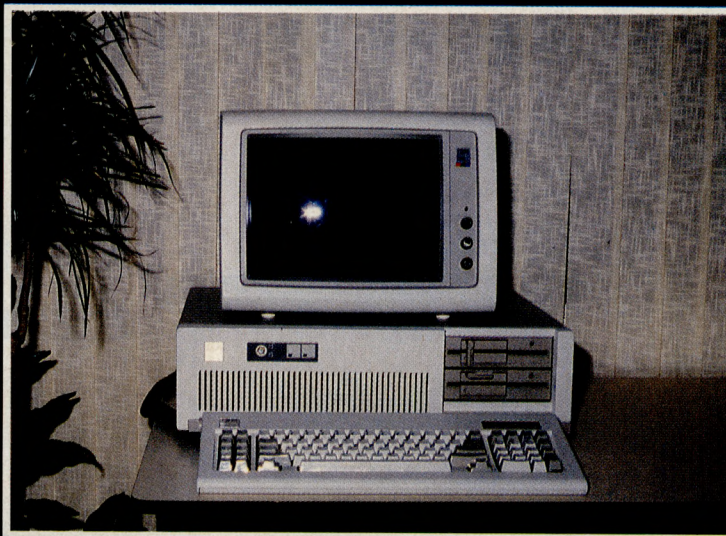
- New Lotus 123 Upgrade
- Spreadsheet
- Graphics
- Database
- Communications
- Word Processing

LOTUS 123 - £375.00

FRAMEWORK £475.00

VARIOUS SELECTION

- PC Tutor 2.0 - £41.00
- CBasic - £140.00
- Pascal/MT+ - £420.00
- Microsoft 'C' - £384.00
- Chess - £61.00
- Norton Utilities - £59.00
- Backgammon - £35.00
- Electronic Disk - £50.00
- Copy II pc - £29.00



BASIC SYSTEM

- IBM Personal Computer
64K RAM, Single sided Disk
Drive
Keyboard, Screen - £1567.00
- IBM Personal Computer
128K RAM, Twin 360K Drives
Keyboard, Screen - £2087.00

BUSINESS SYSTEM

- IBM Personal Computer
256K RAM, Twin 360K Drives,
Keyboard, Screen - £2299.00

Call for our full price list.

HARD DISK SYSTEM

- IBM Personal Computer
128K RAM, 10Mbyte Hard Disk,
Single 360K Floppy Drive
Keyboard, Screen - £3395.00

HERCULES GRAPHICS CARD

- Additional Cost only - £215.00

COLOUR SYSTEMS

- Additional Cost only - £405.00

DATABASE PACKAGES

- dBASE III - £475.00
- DMS - £195.00
- Delta - £495.00
- Everyman - £475.00
- Knowledge Man - £350.00

WORD PROCESSORS

- WordStar - £245.00
- Microsoft Word Mouse - £340.00
- Multimate - £340.00
- Wordcraft - £340.00
- Word Perfect - £425.00
- Display writer II - £245.00

TELEX LINK

- Send telexes from IBM PC
£1350.00

ARABIC IBM PC

- Conversion to Arabic - £590.00
- Arab Word Processor - £595.00

PRINTERS FROM £250.00

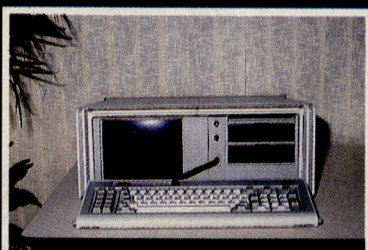
- Epson FX-80, FX-100, LQ1500
- Brother HR15, HR25
- NEC Spinwriter
- Sheet Feeders Available
- Typeface Catalogue Available
- Acoustic Hoods from - £295.00

THE PROFESSIONALS

- Full training provided
- Free warranty Available
- Leasing deals arranged
- Highly competitive quotations
- Long and short term rentals



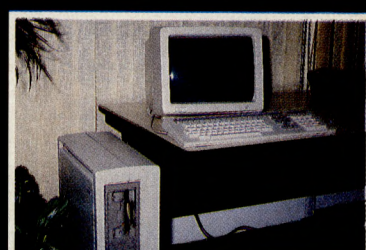
Apricot



IBM Portable



Compaq



Rainbow



637, Holloway Road
London N19 5SS 01-281 2431

14, Charles Street - Hanley
Stoke-on-Trent (0782) 269 883

*67, Westow St. - Upper Norwood
London SE19 - 01-771 6373

*2/4 Paul Street - London EC2
01-247 8577

*Not IBM Authorized

MICROWARE

★ LOW
PRICES**DATAFAST**
BUSINESS SYSTEMS LTD
56, MAPLE DRIVE, EAST GRINSTEAD, WEST SUSSEX, RH19 3UR★ SERVICE
ADVICE**TREAT YOURSELF! AT THESE PRICES YOU CAN AFFORD IT!!****APPLE COMPATIBLE PERIPHERALS**

128K RAM Card with manual & disk	£ 139.95
Disk Drive Controller Card	£ 34.95
16K RAM (language) Card	£ 39.95
80 Column Card	£ 44.95
80 Column Card for ile	£ 44.95
80 Column Card for ile with 64K RAM	£ 84.95
80 40 Column hard switch	£ 9.95
80 Column Inverse Video chip	£ 4.95
280 CPM Card	£ 39.95
280 PLUS Card with Manual	£ 49.95
CP/M 280-B (8MHz) Card with 64K RAM	£ 169.95
Parallel Printer Card (Centronics)	£ 34.95
Parallel Printer Card (Epson)	£ 34.95
SUPER Parallel Card with manual	£ 89.95
Printer Buffer Card (64K dump)	£ 129.95
Grappler Card	£ 79.95
Grappler + Card	£ 84.95
Grappler + 16K Buffer	£ 149.95
Communications Card	£ 32.95
RS 232 Serial Interface Card	£ 34.95
SUPER Serial Card with manual	£ 89.95
7710 Asynchronous Serial Interface	£ 79.95
NTSC to PAL Converter - UHF Mod	£ 44.95
RGB Card (TTL Output)	£ 49.95
RGB Card (LINEAR Output)	£ 49.95
IEEE 488 Controller, cable, disk & manual	£ 149.95
Epson Blower Card (2716, 2732, 2764)	£ 49.95
NEW Epson Blower (2716, 2732, 2764, 27128)	£ 59.95
8 BIT AD/DA Card 8-channel	£ 59.95
12 BIT AD/DA Card	£ 119.95
8 BIT 16 Channel AD Card	£ 59.95
8 BIT 16 Channel AD/DA Card	£ 109.95
CLOCK CARD (TIME II) Card	£ 44.95
Music Card	£ 44.95
Wild Card	£ 69.95
Wild Card Plus	£ 99.95
Four Port Twin 6522 Card	£ 34.95
6809 Card	£ 119.95
Integer Basic Card	£ 32.95
CUMANA Drive for Apple	£ 145.00
AFD - 2 320KB Floppy Drive	£ 249.00
AFD-4 640KB Floppy Drive	£ 289.00
AFD - 4 Controller	£ 59.00
INTEC 5MB HARD DRIVE	£ 1099.00
INTEC 10MB HARD DRIVE	£ 1399.00
(All INTEC drive prices include interfacing, utility & diagnostic software together with 24-month service warranty)	
LOGO Card	£ 59.95
Joystick (2 control buttons)	£ 9.95
Joystick (self centering)	£ 14.95
Joystick (deluxe version)	£ 19.95
Joystick extension cord	£ 3.99
Apple Compatible Power Supply 5A	£ 49.95
ASC II Encoded Keyboard with 1/2 mod.	£ 54.95
IBM STYLE Keyboard for Apple	£ 89.95
A/C Cooling Fan (clip on) with suppress	£ 24.95
Speech Card	£ 79.95
Replay Card	£ 79.95
Fourth Card	£ 89.95
8088 Card with 64K (capacity 128K)	£ 365.00
Light Pen system	£ 195.00
Graphics Table	£ 89.00

PRINTERS - DOT MATRIX

ADMATE - (Shirwa Mechanism)	
ADM-80 F/T 80cps	£ 162
ANADEx - 100% DUTY CYCLE	
DP-9000B 180cps 80 col	£ 789
WP-8000 500cps 132 col (NLQ)	£ 1795
DP-6500 500cps 132 col	£ 2015
BROTHER	
HR-5 Portable Thermal transfer (P or S)	£ 125
EP-44 Thermal transfer (KSR)	£ 189
M-1009 (IBM) 50cps	£ 163
CANON	
PW-1080 160cps (NLQ)	£ 269
PW-1156 160cps (NLQ)	£ 335
EPSON	
RX-80 T 100cps	£ 185
RX-80 F/T 100cps	£ 210
FX-100 F/T 100cps	£ 339
FX-80 100cps	£ 315
FX-100 F/T 160cps	£ 420
LQ-1500 200cps (NLQ)	£ 855
EPSON 8145 Serial I/Face OK	£ 29
EPSON 8145 Serial I/Face 2K buffered	£ 59
EPSON 8148 Serial I/Face 3K buffered	£ 65
XON/XOFF Serial I/Face 2K buffer	£ 65
EPSON/COMMODORE I/Face 2K buffer	£ 53
EPSON 8165 PET IEEE 2K I/Face 2K buffer	£ 65
EPSON PET IEEE Cable 8260	£ 20
EPSON APPLE Card 8132	£ 59
EPSON APPLE Cable 8321	£ 20
8K Buffered parallel or serial I/F	£ 79
16K Buffered parallel or serial I/F	£ 95
32K Buffered parallel or serial I/F	£ 125
64K Buffered parallel or serial I/F	£ 159
HONEYWELL	
L111	£ 349
MANNESSMANN TALLY	
MT-80 80cps	£ 173
MT-160 160cps	£ 395
MT-180 160cps (NLQ)	£ 575
NEC	
PINWRITER P2 (P) 80 col	£ 525
NEWBURY DATA - Heavy Duty	
DRE-8925 Parallel 240cps 132 col	£ 1355
DRE-8850 Parallel 300LPM	£ 2055
OKI - MICROLINE	
OKI-82A P&S 120cps 80 col	£ 239

OKI-84A 200cps	£ 619
OKI-92P 160cps	£ 359
OKI-83A 120cps	£ 385
OKI-240P 350cps	£ 1519
PANASONIC	
KX-P1091	£ 269
RADIX	
10P/T 200cps	£ 439
RITEMANN	
PLUS - (MX-80 FT compatible) 120cps 80col	£ 210
BLUE PLUS (RX-80 FT Comp) 140cps 80col	£ 234
II - (FX-80 compatible) 160cps 80col	£ 259
15 - (FX-100 compatible) 160cps 136col	£ 399
SEIKOSHIA	
GP-80 FT	£ 162
GP-100 VIC 50cps	£ 159
GP-100 Parallel or Serial	£ 159
GP-500A 50cps	£ 169
GP-250X 50cps	£ 199
STAR - One Year Guarantee	
GEMINI 10X F/T 120cps 80 col	£ 185
DELTA 10X F/T 160cps 80 col	£ 295
RADIX 10 F/T 200cps 80 col	£ 410
GEMINI 15X F/T 120cps 132 col	£ 279
DELTA 15 F/T 160cps 132 col	£ 425
RADIX 15 F/T 200cps 132 col	£ 319
TAXAF	£ 249
KP-810 140cps 80col NLQ	£ 319
KP-910 140cps 156col NLQ	£ 328
TEC	
1550 Parallel	£ 450
1550 Serial	£ 489
TOSHIBA - 24 Wire Head	
TH-2100H Serial 100cps (NLQ)	£ 1269

PRINTERS - DAISY WHEEL

BROTHER	
HR-1 Parallel 16cps	£ 245
HR-15 Parallel 20max	£ 319
HR-25 Parallel 25cps	£ 549
HR-35 Parallel 35cps	£ 729
HR-15 Keyboard	£ 129
HR-15 Sheet Feeder	£ 179
HR-15 Tractor Feed Unit	£ 60
HR-25 35 Sheet Feeder	£ 185
HR-25 35 Tractor Unit	£ 75
SPECIAL COMBI PRICE	
HR-35 + SHEET FEEDER	£ 829
TOWA	
Daisy Junior 14cps 80col	£ 199
Daisystep 2000 18cps 132col	£ 219
DIABLO	
630-API 40cps	£ 1289
630-API Sheet Feeder	£ 479
EPSON	
DX-100 Parallel or Serial 20cps	£ 185
UJUK	
6100 18CPS	£ 315
6300	£ 795
2200	£ 249
2100	£ 169
NEC SPINWRITER	
3510 Serial 35cps	£ 1045
3530 Parallel 35cps	£ 1045
7710 Serial 55cps	£ 1429
7730 Parallel 55cps	£ 1429
2010 Serial 20cps	£ 539
2030 Parallel 20cps	£ 539
DUME	
11 40 RO (without interface)	£ 1165
9 45 RO full front panel	£ 1525
12 20 Letter Pro (S or P) 20cps	£ 445
9 55 RO full front panel 15cps	£ 1895
11 55 RO (without interface)	£ 1359
QUEN DATA	
Daisy Wheel Parallel 18cps	£ 219
RICOH	
RP-1300S Parallel 30cps	£ 865
RP-1600S Parallel 4K 60cps	£ 1165
FLOW RP-1600 (P or S)	£ 1235
FLOW RP-1600 IBM-PC 8K	£ 1279
Elec Mech Sheet Feeder RP-1600	£ 445
Tractor Unit for 1600 Models	£ 129
SILVER REED	
EXP-400 Parallel 10cps	£ 235
EXP-400 Serial 10cps	£ 260
EXP-500 Parallel 16cps	£ 279
EXP-500 Serial 16cps	£ 315
EXP-550 Parallel 19cps	£ 455
EXP-550 Serial 19cps	£ 497
EXP-770 Parallel 36cps	£ 755
EXP-770 Serial 36cps	£ 864
Tractor for 500	£ 84
Tractor for 550 770	£ 105
Cut Sheet Feeder for 500	£ 163
Cut Sheet Feeder for 550 770	£ 163
8K Buffer for 770	£ 95
16K Buffer for 770	£ 95
48K Buffer for 770	£ 259
SMITH CORONA	
TP-1 SERIAL ONLY 12cps	£ 149
TEC STARWRITER	
F10 40 Parallel 40cps	£ 830
F10 55 Parallel 55cps	£ 1229
Elec Mech Single Sheet Feeder	£ 445
Tractor for F10 units	£ 129

MONITORS

SANYO	
DM-2112 40 col 15MHz + P31	£ 63
DM-8112CX 80 col 18MHz + P31	£ 83

CD-3125 14" Normal Res. RGB	£ 169
CD-3117 14" Medium Res. RGB	£ 296
CD-3115 14" High Res. RGB	£ 389
DMC 7650 IBM/APRICOT Colour Monitor	£ 799
YAN JEN	
GN-1211 12" Green or Amber 20MHz with tilt & swivel base	£ 83
ZENITH	
122E 12" 15MHz AMBER	£ 84
123E 12" 15MHz Green	£ 79
Tilt base for above	£ 8
ZVM-133 13" Colour Hi. Res. (IBM-PC)	£ 329
Cable for ZVM-133/IBM-PC	£ 15
PLOTTERS	
EPSON H180 Plotter	£ 349
ASTAR MCP-40 4-Colour 80 character	£ 105
ASTAR MCP-80 4-Colour full graphics	£ 165
COLOUR PRINTERS	
SEIKOSHIA GP-700A	£ 345
EPSON JX-80 160cps Text	£ 469
DIABLO 150C	£ 799
ANADEx DP-9725B	£ 1299
HARD DRIVES & CONTROLLER PACKAGES - A11	
CSI RODIME inc. cable host controller manual & support disk. Available for IBM-PC, APRICOT, PC-COMPATIBLES, SANYO 550 555.	
11 MB WINCHESTER + CONTROLLER	£ 999
22 MB WINCHESTER + CONTROLLER	£ 1259
33 MB WINCHESTER + CONTROLLER	£ 1399
44 MB WINCHESTER + CONTROLLER	£ 1599
HARD DRIVE + CONTROLLER + STREAMER - All CSI RODIME CIPHER supplied with cables, host controller, manuals & support disks. In versions for IBM-PC, APRICOT, PC-COMPATIBLES & SANYO	£ 1749
11 MB WINCHESTER CONTROLLER STREAMER	£ 1999
22 MB WINCHESTER CONTROLLER STREAMER	£ 2259
33 MB WINCHESTER CONTROLLER STREAMER	£ 2389
44 MB WINCHESTER CONTROLLER STREAMER	£ 2389

COMPUTERS

APRICOT	
F1	£ 910
PC 256K + 2 x 315K + Monitor	£ 1389
PC 256K + 2 x 720K + Monitor	£ 1529
XI 256K + 10MB + Monitor	£ 2189
SIRIUS	
128K + 1MB	£ 1695
256K + 10MB	£ 2845
BBC	
MODEL - B	£ 315
COMMODORE 64	£ 179
SANYO	
MCB 550 128K + 1 x 160K + software	£ 595
MCB 555 128K + 2 x 160K + software	£ 789
MCB 550-2 as 550 but 360K Drive	£ 789
MCB 555-2 as 555 but dual 360K dr	£ 1169
CRT 36 Hi. Res. 12" Green Monitor	£ 110
CRT 50 Med. Res. Colour Monitor	£ 279
CRT 70 Hi. Res. Colour Monitor	£ 419
MCB 232 - RS232 I/Face board	£ 49
64K RAM Plug in Module	£ 79
EPSON	
PX-8 Portable Computer	£ 699
120K RAM Disk for above	£ 249
PXB - 120K RAM Disk	£ 889
QX-10 Desk Top Computer	£ 1569
ZENITH	
Z-150PC 2 x 320K + 128K RAM	£ 1545
Z-150PC with 10MB Hard Drive	£ 2799
Z-160PC Transportable 2 x 320K + 9" display	£ 1729

SOFTWARE

WORDSTAR	£ 189
DBASE II	£ 229
FRIDAY	£ 129
FRAMEWORK	£ 335
LOTUS 1 2 3	£ 399
SYMPHONY	£ 415
DMS-DELTA	£ 390
MULTIMATE	£ 235
OPEN ACCESS	£ 349
DBASE III	£ 355
SUPERCALC II	£ 179
SUPERCALC III	£ 199
MULTIPLAN	£ 115
PEACHTREE ACCOUNTS	£ 75
PFS FILE	£ 75
PFS REPORT	£ 65

DRIVES - MEGABYTES FOR MICROPOUNDS!

5 1/4" 1/2 Height SS/DD 160KB Apple Compatible	£ 109
5 1/4" 1/2 Height 500KB 40 80	£ 119
5 1/4" 1/2 Height 1MB 40 48	£ 125
5 1/4" 1/2 Height 1.6MB 40 80	£ 159
5 1/4" 1/2 Height 2MB 40 80	£ 199
3 1/2" 1/2 Height 500KB	£ 119
3 1/2" 1/2 Height 1MB	£ 125
8" Full Size 1.6MB	£ 309
8" 1/2 Size 1.6MB	£ 282
HR 521 1/2 Height 12.75 MB Hard Disk unformatted	£ 492
All brands boxed, with built in controller - standard power requirements. Full documentation and technical details	

REMEMBER! Even if you don't see it advertised here we can probably supply it AND FOR LESS. Problems with limited space means that we are only able to advertise a limited range of products. Additional prices on application. Consumables, paper, ribbons etc. supplied at exceptional prices. 24-HOUR DELIVERY on items ex stock. CARRIAGE WITHIN UK:

Items which may be dispatched by POST (eg, peripheral cards etc.) add £2.00 per order for any order under £50.00. ORDERS EXCEEDING £50.00 CARRIAGE FREE.

Items which must move by CARRIER (such as printers, monitors etc.) will be delivered within 24 hours for a charge of £10.00. OR ALTERNATIVELY within 48 hours at a charge of £7.50.

Add 15% VAT to all prices given. Remember, VAT is also applicable on carriage at 15%. Terms CWO. DEALER ENQUIRIES WELCOME. FOREIGN enquiries if possible by telex please. MONEY BACK GUARANTEE. SEND £1 FOR OUR LATEST CATALOGUE OF OVER 3000 ITEMS.

TEL: (0342) 24631 • 313427 TLX: 957547



THE 1985 PCW SHOW



CAN YOU AFFORD NOT TO BE SEEN THERE?

Don't miss out.

Now is the time to book your stand at the eighth Personal Computer World Show in September.

Last year's show, in its new Olympia setting, was a resounding success. It confirmed the status of Personal Computer World Show as the nation's principal microcomputer marketing event and the greatest launch-point for new products.

The 1985 show, bigger than any of its seven predecessors, will be the essential venue for all serious business users. More for them to see, more to assess and more to buy.

The first two days are exclusively devoted to meeting the business users and the trade. The biggest ever array of business, home, hobby and education microcomputing hardware and software. Plus conferences and seminars.

From 4-8 September 1985, Personal Computer World means business. It's an exciting prospect. So be there.

Fill in the coupon below to be sure of your stand at the eighth and the greatest Personal Computer World Show.

To: Roger De'Ath, PCW 85, 11 Manchester Square, London W1M 5AB
Phone 01-486 1951

I don't want to miss out on PCW 85. Send me details and the costs of exhibiting at the show.

Name.

Company.

Position.

Address.

Tel. No.:

Date.

Sponsored by:

**Personal
Computer**
World

4-8 September 1985 Olympia London

The 1985
**Personal
Computer**
World
Show



UNBELIEVABLE SAVINGS

** COMPUTERS **

APRICOT	F1 - from	EX VAT
APRICOT	Point 7 from	£775.00
APRICOT	PORTABLE from	£2950.00
APRICOT	256K 315Kx2 MONITOR	£1495.00
APRICOT	256K 720Kx2 MONITOR	£1395.00
APRICOT	Xi 256k 10MB MONITOR	£1545.00
BBC	B	£2195.00
CIFER	9000 Multi User 21MB	£320.00
COMMODORE	8250 DISK DRIVE	£5095.00
COMMODORE	8296	£785.00
COMMODORE	SX-64 PORTABLE	£695.00
COMMODORE	64	£675.00
COMMODORE	DISK 1541	£156.51
COMMODORE	PARALLEL INTERFACE	£165.21
COMMODORE	1530 C2N CASSETTE	£59.50
COMPAQ2	2X360K	£32.00
COMPAQ	Plus(10MB)	£1795.00
IBM PC	List less 17.5%	£3195.00
OLIVETTI	M20 160KB 2x320KB Drives	PHONE
OLIVETTI	M24 128KB 2x360KB Drives	£1295.00
OLIVETTI	M24 128KB 10MB Hard Disk	£1575.00
SAGE	II & IV	£2695.00
SANYO	MBC 555 128K 2x160K Drives	POA
SIRIUS	256K 10MB	£795.00
SIRIUS	256K 2.4MB	£2850.00
SIRIUS	128K 1.2MB	£2095.00
ACT/IBM	Memory Expansions from	£1645.00
PLUS 5	External Hard Disk Drives	£222.00

** SOFTWARE **

ALL MAJOR SOFTWARE PROGRAMS SUPPLIED AT LOW COST

D BASE III	£360.00
WORDSTAR	£195.00
OPEN ACCESS	£360.00
LOTUS 123	£295.00
SYMPHONY	£420.00
MULTIMATE	£240.00
D BASE II	£230.00
DMS DELTA	£395.00
FRIDAY	£135.00
FRAMEWORK	£345.00

Not only do we offer top quality products at low prices. We also support and develop Software with the assistance of our long established software dept. NEW RELEASE — UNIX MULTI USER ACCOUNTS SOFTWARE.

** MATRIX PRINTERS **

ANADEx	DP-6500 500cps	EX VAT
ANADEx	WP-6000	£2234.00
BROTHER	EP44	£1961.00
BROTHER	HR5	POA
BROTHER	M1009 50cps	POA
CANON	PW1080A 160cps (NLQ)	£159.00
CANON	PW1156A 160cps (NLQ)	£299.00
EPSON	RX 80T 100cps	£379.00
EPSON	RX 80T 100cps	POA
EPSON	FX 80 160cps	POA
EPSON	LQ 100F/T 160cps	POA
EPSON	LQ 1500 200cps (NLQ)	POA
HONEYWELL	From	£375.00
MANNESMANN	MT80 80cps	£177.00
MANNESMANN	MT180 160cps (NLQ)	£579.00
NEC	PINWRITER P2(P)(NLQ)	£535.00
NEWBURY	DRE 8850 300ipm	£2065.00
NEWBURY	DRE 8925 240cps	£1385.00
OKI	84A 200cps	£625.00
OKI	OKI 92P 160cps	£360.00
OKI	OKI 2410P 350cps	£1535.00
OLIVETTI	DM4100E 120cps	£520.00
PANASONIC	KP1091 120cps + NLQ	£249.00
SHINWA	CP80 Model II FT	£165.00
STAR	DELTA 10 160cps	£299.00
STAR	DELTA 15 160cps	£399.00
STAR	GEMINI 10X 120cps	£189.00
STAR	GEMINI 15X 120cps	£269.00
STAR	RADIX 10 200cps (NLQ)	£419.00
STAR	RADIX 15 200cps (NLQ)	£525.00
TOSHIBA	TH2100H 192cps	£1275.00
TREND	930 200cps NLQ 80cps	£1350.00

MAYFAIR MICROS

BLenheim HOUSE, PODMORE ROAD, LONDON SW18 1AJ

TEL: 01-870 3255 / 871 2555

We accept official orders from UK Government and Educational Establishments. Mail Order and Export Enquiries welcome. Callers by appointment.

** DAISYWHEEL **

** PRINTERS **

BROTHER	HR1	EX VAT
BROTHER	HR15	POA
BROTHER	HR15 Keyboard	POA
BROTHER	HR15 Sheetfeeder	POA
BROTHER	HR25	POA
DAISYSTYEP	2000 20cps	£219.00
DIABLO	630 API	£1295.00
DIABLO	Sheet Feeder	£490.00
FUJITSU	SP320 48cps	£795.00
JUKI	6100 18cps	£325.00
NEC	2010 Serial 20cps	£545.00
NEC	2030 Parallel 20cps	£545.00
NEC	3510 Serial 35cps	£1049.00
NEC	3530 Parallel 35cps	£1049.00
NEC	7710 Serial 55cps	£1440.00
NEC	7730 Parallel 55cps	£1440.00
OLIVETTI	DY450 45cps	£880.00
QUME	11/40 RO	£1185.00
QUME	9/45 RO	£1550.00
QUME	LETTERPRO 12/20	£475.00
RICOH	RP1300S	£895.00
RICOH	RP1600S	£1175.00
RICOH	RP1600S FLOWWRITER 8k	£1249.00
RICOH	RP1600S FLOWWRITER 8k	£1299.00
RICOH	RP1600S Sheet Feeder	£459.00
RICOH	RP1600S Tractor	£138.00
CORONA	TP1 12cps	£154.00
TEC	STARWRITER F1040 40cps	£895.00
TEC	STARWRITER F5055 55cps	£1235.00
TEC	Sheetfeeder	£459.00
TEC	Tractor	£138.00

CIFER	T4	£760.00
HAZELTINE	ESPRIT Fixed Keyboard	£395.00
QUME	QVT 103 (VT100 VT131)	£695.00
TELEVIDEO	910	£489.00

AST, HERCULES, QUADRAM, SIMONS ALL AT BIG SAVINGS

POA

SHARP MZ-700 SERIES

USERS MAGAZINE

OVER 140 PROGRAMS

4 BOOKS

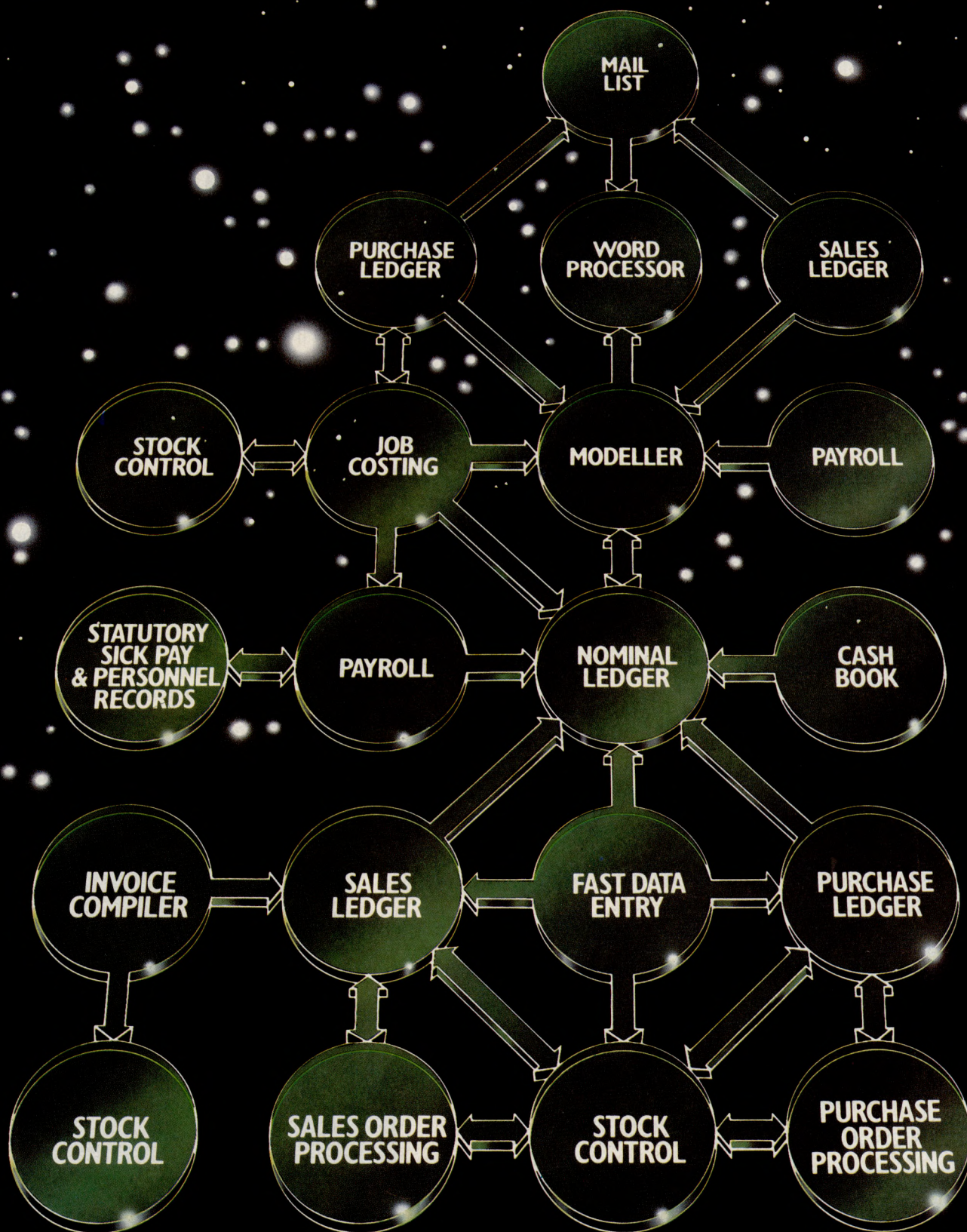
12 PERIPHERALS

SPECIAL OFFER
SEND FOR OUR COLOUR CATALOGUE NOW

SOLO SOFTWARE

95B BLACKPOLE TRADING ESTATE
WORCESTER WR3 8TJ
TELEPHONE (0905) 58351

One stop. accounting software...



...quite simply, none better.

At a TABS Business Centre you'll get free advice, the best hardware and software, expert training and a professional installation service – all in one place.

Head Office: TABS Ltd., Dolphin House, New Street, Salisbury, Wiltshire.

For your nearest one stop Business Centre
phone Salisbury

0722-338668



The Victor Computer.

It isn't simple.

But then, who wants to work with an idiot?

Meet the Victor 9000, a 16 Bit personal computer.

It's not designed to be especially simple to use, because learning to use it will not be a problem.

Instead, it's designed to work smoothly with you and your colleagues, in your office, every day.

So why not treat the Victor and its competitors as if they were a group of candidates for a job, and ask exactly the same sort of questions.

These are the answers you'll get from us.

"Can you do the job?"

The work a computer can do is principally defined by the software available for it.

And Victor computers have one of the widest software choices in the world.

Some software packages transform the Victor into a versatile assistant who can handle wordprocessing, financial planning and day-to-day book-keeping with incredible speed.

Others turn a Victor into a skilled specialist for any business in the Yellow Pages.

"What experience do you have?"

The Victor was one of the first 16 Bit computers on the market and the design has proved its effectiveness in over 28,000 installations in the UK.

Somebody in your line of business is probably working with a Victor computer right now.

"Can you grow with the job?"

You can expand a Victor system in three main ways.

You can increase the memory of your machine by plugging in extra memory boards, to give a maximum

storage capacity of 896Kb. (That's 100 more than the

IBM PC.) You can run a multi-user programme which enables two or three people to work with one machine.

Or, you can start building a network, where one Victor acts as a file server for up to five others.

"What sort of money are you looking for?"

A Victor 9000 system costs from around £3,000, which includes a printer, a software package and a Victor 9000 computer with a capacity of 128K RAM and 1.2Mb of disk storage. The prices of our larger machines are just as competitive.

Now. Before you meet the Victor, meet the dealer.

At Victor Technologies, we've just taken over the distribution of these versatile computers – so we've taken the opportunity to build a new network of dealers.

Weeding out the bandits. And concentrating on the kind of professional dealerships who'll help you get the right system and software to start with, train you and your colleagues to work with it – and help you expand your system as you grow.

Send off the coupon, and we'll make the introductions.



VICTOR

PERSONNEL COMPUTERS

Please ask my Victor dealer to make an appointment with me.

Name _____

Company _____

Area of operation _____

Address _____

Send to: Victor Technologies (UK) Ltd., Dept. PCW1, 5 Albert Road, Crowthorne, Berks. RG11 7LT. Tel: 0344 761683.

Educational Software LCL



A COMPLETE ENGLISH LANGUAGE COURSE
OF 24 EASY TO USE PROGRAMS
FOR O-LEVEL SELF TUITION OR REVISION

NEW

**BBC Micro
ZX Spectrum
unexpanded VIC
Electron
ZX81
Apple
PET**

**Commodore 64
NEC PC8201A**

**All software for the
above computers.**

MICRO ENGLISH (BBC, Electron), complete English Language O-Level, self-tuition or revision course of 24 programs, includes 'Speak and Spell' programs (no extras required), 2 disks/tapes. £24.50.

MICRO MATHS 24 program revision or self-tuition course to O-Level. £24.50 (except ZX81 £12.00).

FRANCIS DRAKE ADVENTURE GAME Authentic, historical, graphics, adventure game. £6.50.

ANIMATED ARITHMETIC Teaches using moving colour pictures (not words). Ages 3-8. £6.50 (disk £7.50).

BRAINTEASERS Book of programs to puzzle and amuse. £5.95. "Excellent" — EDUCATIONAL COMPUTING.

Immediate dispatch Micro Maths, Micro English and Master Maths. Phone or send orders or requests for free catalogue (200 programs) to:

World leaders in educational software
(distributors in 24 countries)

LCL

26 Avondale Ave.
Staines, Middx.
Tel: 0784 58771
24 hrs. Orders



GENEROUS TRADE
DISCOUNTS.

VISA

AS SEEN ON TV

OPTIMUM

Added Value for DEALERS
Added USER Satisfaction

A mature PROGRAM GENERATOR, tutorial and

MULTI USER DATABASE THAT REALLY WORKS

with full RECORD LOCKING file protection

available NOW on APRICOT POINT 7
and ICL, LSI, ORION and other multi-user PCs

Super effective too on the MSDOS standalones
like IBM ... like IBM ... like IBM ... like IBM ...

within which INTEGRATION is possible with your
favourite programs, spreadsheets, WP etc ...

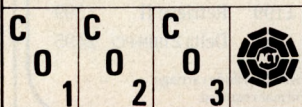
EASY TO USE BUT TOTALLY PROFESSIONAL IN RESULT

Professional
Software Services Limited

Dept. PCW 2/4 Eton Place, MARLOW, Bucks
SL7 2QA Tel: 06284 75411, 75244
Or Dept. PCW 480 Groveley Lane, Rednal,
BIRMINGHAM Tel: 021 445 1039

tangolynk

APRICOT, SIRIUS, COMPAQ,
HP150, FUTURE COMPUTERS,
IBM PC, XT, AT, COMART,
OLIVETTI M24, ORION, STC
XTRA, WORDPLEX, LOGICA
VITESSE, ALMAR, FERRANTI
ARGUS PC



Darling,
they're playing our tune

Dance with ICL at

Network Designers Limited



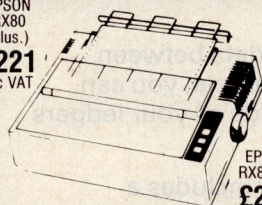
This software package has been
officially recognized by ACT for use
with Apricot & Sirius personal Computers

The Old Berkshire Hunt Kennels
Kingston Bagpuize
Oxon OX13 5AP
Telephone (0865) 821177

YEAR ROUND SALE CONTINUES

DOT MATRIX

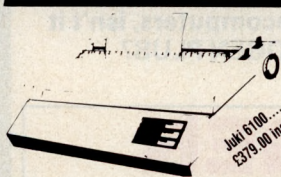
EPSON
RX80
(illus.)
£221
inc VAT



EPSON
RX80 F/T
£249
inc VAT

Epson RX80 £192.17 + VAT = £221
Epson RX80 F/T £216.52 + VAT = £249
Epson FX80 £329.57 + VAT = £379
Epson FX100 (132 col. width) £511.30 + VAT = £588
KDC FT5001 (Epson compatible) £203.48 + VAT = £234
Kaga Taxan 810 (NLQ) £277.39 + VAT = £319
Kaga Taxan 910 (NLQ 132 col.) £346.96 + VAT = £399
RS232 Interfaces from £27.83 + VAT = £32
Printer cables from £10.43 + VAT = £12

DAISYWHEEL

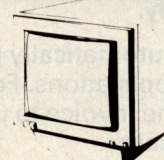


Juki 6100 £329.57 + VAT = £379
Daisystep 2000 £230.43 + VAT = £265
Tractor Unit £100.00 + VAT = £115

PROCESSORS

BBC Model B £346.96 + VAT = £399
BBC B with DFS £407.83 + VAT = £469
Amstrad CPC454 £157.39 + VAT = £181
ISL 8088 (IBM Comp) £1173.39 + VAT = £1350
DEC 11/23 + 40Mb £6086.96 + VAT = £7000
DEC 11/73 + 170Mb £10434.78 + VAT = £12000
Opus disk drives from £86.09 + VAT = £99
WS2000 modem inc. cable £129.57 + VAT = £149
PHONE FOR OUR QUOTATION ON BESPOKE ACCOUNT-
ING SOFTWARE INVOICING/LEDGERS/PAYROLL

colour MONITORS



MICROVITEC
1451 QL
Medium Res.
£265
inc VAT

Amstrad CTM640 £146.96 + VAT = £169
Microvitec 1451 QL £230.43 + VAT = £265
Microvitec 1451 BBC £242.61 + VAT = £279
1451 RGB/PAL/AUDIO £300.00 + VAT = £345
Microvitec 1441 £433.91 + VAT = £499
(High Res. BBC)
Taxan Kaga Vision III £326.09 + VAT = £375
(BBC/APPLE/IBM)

mono MONITORS

Amstrad GT64 £51.30 + VAT = £59
Sanyo DM8112CX (18MHz) £86.09 + VAT = £99
ISL18 Professional £60.00 + VAT = £69
(18MHz metal case)
ISL20 Swivel 80 col £68.70 + VAT = £79
(20MHz tilt & swivel base)

micro FAST

The Experts
57 Hoxton Square London N1
01-729 1778

Prices are correct at time of going to
press

Access and Visa welcome
Open Mon - Sat 9am to 6pm
Phone for Mail Order carriage details



The software game is up!

Why should you pay thousands of Pounds for many of your business programmes when you can write them yourself in a short time?

PROGEN PLUS is a revolutionary new software to enable you to do just that!! It is not another old fashioned "Database Manager" or a "Program Writer".

PROGEN PLUS is simple to use and totally flexible.

To write a computer programme using PROGEN PLUS, all you do is to answer a number of simple questions about your application . . . and simply wait for a few minutes for the computer to automatically "create" all necessary programmes, data files, screen layouts etc.

You do not have to be a computer programmer, or indeed know any programming languages, "control codes" etc. PROGEN PLUS uses commands in plain English to put you in full control of your data. You can organise months of data in minutes, or your entire business with little more effort.

PROGEN PLUS is a true Multi-file, Multi-record and Multi-key "Database" and includes a very powerful report writer. You design your own "forms" on the VDU screen as you go along effortlessly.

You can automatically pass data between various applications. For example, you can arrange the invoice to upgrade all your ledgers automatically.

PROGEN PLUS report-writer includes a "mail-merge" facility, to produce "mail-shot" letters, address labels . . . or, indeed almost anything you like using any kind of printer.

PROGEN PLUS is available now for a number of CP/M and MS-DOS computers including **Apricot, Sirius, IBM-PC, Microplus,** and many others.

If you have been wasting too much time and money in software for microcomputers, isn't it now time you examined PROGEN PLUS?

PROGEN
Now on IBM PC with
3-D Graphics

LIMROSE SOFTWARE
Aerial Road, Llay Industrial Estate,
WREXHAM, Clwyd, LL12 0TU, U.K.
Tel. 097 883 5555/6 Cable: LIMROSE



The 'Classic' Menu Generator.

Eliminate all user contact with operating system commands. Use MENUGEN from Microft Technology to create menus to access all your regularly used programs.

MENUGEN is a utility which will create menus for any activity. A menu selection, will run a program, call another menu, return to a previous menu, run a basic program, execute operating system commands, or exit to the operating system.

User Ltd. Selection Menu

- 1 ASPECT
- 2 Wordstar
- 3 Lotus 123
- 4 Disk formatting menu
- 5 Exit to operating system

Please type in selection number

FACILITIES INCLUDE

UP TO 16 MENU OPTIONS PER MENU SCREEN
UP TO 15 LEVELS OF NESTED MENU
OPTIONAL PASSWORD PROTECTION ON
MENU SELECTIONS · OPTIONAL LOGGING
OF ALL SELECTIONS TAKEN

MENUGEN is available for most micros with one of either the CPM or MS DOS family of operating systems, including IBM PC and compatibles, Sirius, Apricot and many Z80 machines. MENUGEN costs £48 + VAT (£55.20) and is available from Microft Technology Limited, 45a Radnor Walk, London SW3 4BP. To order, or for information, telephone 01-352 7876.

MENUGEN

MENUGEN is a Trade Mark of Microft Technology Limited and is a British product.

Looking for the best dBASE® offer available



includes, ABSOLUTELY FREE,
the SYBEX BOOK
"Understanding dBASE II"

£279
Cash / Cheque with Order

OTHER SOFTWARE AVAILABLE

dUtil	£69	Friday	£175	Rescue III	£375
Expressbase II	£119	Compsoft DMS+	£195	dBase III (IBM PC)	£399
dGraph	£179	Autocode	£199	Retrieve II	£399
Quickcode	£179	Infostar	£259	Delta 2 (IBM PC)	£495

--- Please add VAT to the above prices which include carriage ---
stating Computer type and Format required.

BOOKS

Advanced dBase II Users Guide	£31.30	Everyman's Database Primer II	£13.50
Advanced Techniques in dBase II	£17.95	Everyman's Database Primer III	£13.50
DELTA, Data & You	£9.95	The Illustrated dBase II Book	£17.95
dBase II for Every Business	£13.50	Mastering dBase II Easy Way	£16.45
dBase II for First Time User	£13.75	Understanding dBase II	£17.95
dBase II Guide for Small Business	£16.50	Understanding dBase III	£19.95

E & O E Please add 1.90 for single books towards packing & post
(plus 0.60 for each additional book)

MAIL ORDER ONLY

Send for latest Price List stating type of Computer & specific interests.

PARKINS ASSOCIATES

PARKINS ASSOCIATES (PCBW3)
20 RIDGEWAY, RAYLEIGH
ESSEX SS6 7BJ

Tel: 0268 - 743928

Cash / Cheque
with order
or Access



Prices as at 25/1/85

OUR LOW, LOW PRICES

COMPUTERS

Sinclair QL	£329.00
Sinclair Spectrum Plus	£120.00
BBC model B	£320.00
Sanyo MBC550 (with free wordprocessing and database software)	£599.00
Sanyo MBC555 (with free wordprocessing and database software)	£799.00

Sanyo Monitors for above	
CRT 36 High resolution Green Screen	£119.00
CRT 50 Medium resolution Colour Screen	£299.00
CRT 70 High resolution Colour Screen	£399.00
Optionals for above	
MBC 232 Serial Interface Board	£45.00
Sanyo 64K Plug in Memory	£85.00

MONITORS

Dyneer 12" (IBM PC)	£179.00
Philips 12" TP200 Green	£79.00
Sanyo DM8112 Green	£89.00
Sanyo DM9112 Green	£99.00
Sanyo CD3125 14" RGB	£159.00
Sanyo CD3117 14" RGB	£279.00
Sanyo CD3115 14" RGB	£299.00
Sanyo DMC7650 (IBM-PC/Apricot-Colour)	POA
Yangen GM1211 12" Green (Green or Amber and tilt & swivel)	£99.00
Zenith ZVM122 (Amber or Green 12")	£89.00
Zenith 13" High Res (IBM-PC)	£340.00

DAISY WHEEL PRINTERS

Brother HR1	£249.00
Brother HR15	£350.00
Diablo 620	£649.00
Diablo 630 AP1	£1,259.00
Nec 2000	£499.00
Nec 3530/3510	£1,150.00
Nec 7730/7710/715	£1,499.00
Qume 12/20	£499.00
Qume 11/40	£1,250.00
Ricoh RP1200	£520.00
Ricoh RP1300S	£849.00
Ricoh RP1600S	£1,260.00
Ricoh 1300 Flowriter	£995.00
Ricoh 1600 Flowriter	£1,290.00
Silver Reed EXP400/P	£199.00
Silver reed EXP500/P	£249.00
Silver Reed EXP550/P	£399.00

Silver Reed EXP770/P	£640.00
Smith Corona TP1	£188.00
Tec F10/40	£869.00
Tec F10/55	£1,150.00

DOT MATRIX PRINTERS

Admate ADM-80	£199.00
Anadex DP-9000B	£899.00
Anadex DP-9500B	£995.00
Epson RX-80 T 100 cps	£199.00
Epson RX-80 FT 100 cps	£299.00
Epson RX-100 FT 100 cps	£349.00
Epson FX-80 160 cps	£349.00
Epson FX-100 FT 160 cps	£449.00
Epson LQ-1500	£889.00
OKI-Microline 82 A	£239.00
OKI-Microline 83 A	£379.00
OKI-Microline 92 A/P	£349.00
OKI-Microline 93 A/P	£449.00
OKI-Microline 84 A/P	£599.00
Seikosha GP-50A	£99.00
Seikosha GP-100	£120.00
Seikosha GP-500A	£139.00
Seikosha GP-250X	£179.00
Seikosha GP-700A (Colour)	£349.00
Star Gemini 10X	£219.00
Star Delta 10	£349.00
Star Radix 10	£499.00
Star Gemini 15X	£299.00
Star Delta 15	£420.00
Star Radix 15	£549.00
Tec 1550/P	£479.00
Tec 1550/S	£499.00
Nec P3 Pinwriter	£549.00
Panasonic KX-P1091 (IBM-PC)	£279.00
Brother M1009	£169.00
Brother TC600 (Typewriter or Printer)	£349.00

MODEMS (Multi-Standard)

WS 2000 Minor Miracles	£119.00
Nightingale from Pace	£99.00

DISK DRIVES (All half height)

Single sided, 40 Track	£99.00
Double sided, 40 Track	£131.50
Double sided, 80 Track	£147.00
Double sided, 40/80 Track	£153.00

Hard Disk and Tape Systems

WINCHESTER 5.25 HARD DISK DRIVES. (SUPPLIED WITH CABLE, HOST ADAPTOR BOARD, MANUAL AND SUPPORT DISKETTE), COMPATIBLE WITH IBM-PC AND COMPATIBLES, SANYO 550/555 AND ACT APRICOT (UNFORMATTED MEMORY).

11 MByte Hard Disk Drive	£995.00
22 MByte Hard Disk Drive	£1,195.00
33 MByte Hard Disk Drive	£1,395.00
44 MByte Hard Disk Drive	£1,595.00

WINCHESTER DISK DRIVE PLUS TAPE STREAMER, COMPLETE WITH CABLES, HOST ADAPTOR, MANUALS AND SOFTWARE SUPPORT DISKETTE. COMPATIBLE WITH IBM-PC, SANYO 550/555 AND ACT APRICOT (UNFORMATTED MEMORY).

11 MByte Drive Plus Tape Streamer	£1,650.00
22 MByte Drive Plus Tape Streamer	£1,870.00
33 MByte Drive Plus Tape Streamer	£1,995.00
44 MByte Drive Plus Tape Streamer	£2,420.00

CARTRIDGE TAPE STREAMING BACK-UP. FOR IBM-PC XT. BACK-UP 10 MBYTES IN UNDER 10 MINUTES. QUARTER INCH CARTRIDGE TAPE (NOT SUPPLIED).

Cipher Cartridge Tape Streaming Back-Up	£720.00
---	---------

LISTING PAPER (Boxed 2000 Sheets)

Plain or Music Ruled	£10.90
Plain or Music Ruled	£14.90

Prices per box of 10 Diskettes

TRACKS/TP1	NASHUA	MAXELL	FUJI	WABASH
SS/SD 40/48	12.70	15.45	—	14.80
SS/DD 40/48	13.70	—	15.00	17.00
DS/DD 40/48	16.20	22.80	21.00	19.00
SS/QD 80/96	17.00	21.00	—	21.00
DS/QD 80/96	18.70	32.25	25.00	25.00

Call for prices on 8" Diskettes

Telephone for our prices on professional software
Urgent orders — Telephone to arrange despatch
9.30am–5.30pm Monday to Saturday
All prices, plus VAT and carriage

Pearl computer systems

62 Greenway Gardens,
Greenford,
Middlesex UB6 9TX,
England, UK.
Tel: 01-578 7247

COMPUTER WAREHOUSE

1000's OF BARGAINS FOR CALLERS

THE 'ALADDIN'S' CAVE OF COMPUTER AND ELECTRONIC EQUIPMENT

RECHARGEABLE BATTERIES

Dry Fit Maintenance FREE by Sonnenschein.
A300 07191315 12v 3 AH same as RS 591-770 NEW £13.95 A300 07191202 6-0-6 1.8 AH same as RS 591-382 EX EQUIP £4.99 Miniature PCB mount 3.6v 100 Mah as RS 591-477 NEW £1.00 SAFT VR2C 1.2v "C" size NICADS in 18 cell ex equipment pack. Good condition - easily split to single cells £10.50 + pp £1.90

EX-STOCK INTEGRATED CIRCUITS

2732 ex equip £3.25, 27128 - 250ns NEW £12.00.
6116-200 £4.50, 6116-250 £3.95,
6264LP-150 £22.00, 4164-200 £3.50, 4864-150 £4.00,
4116-300, £1.20, 2114 £1.75, 6800 £2.50, 6821 £1.00,
68A09 £8.00, 68B09 £10.00, 68B09E £14.50,
D8085AH-2 £12.00, D8086 £20.00, Z80A £2.99.

COOLING FANS

Keep your hot parts COOL and RELIABLE with our range of BRAND NEW professional cooling fans.
ETRI 99XUOI Dim. 92 x 92 x 25 mm. Miniature 240 v equipment fan complete with finger guard. £9.95.
GOULD JB-3AR Dim. 3" x 3" x 2.5" compact very quiet running 240 v operation. NEW £6.95
BUHLER 69.11.22. 8-16 v DC micro miniature reversible fan. Uses a brushless servo motor for extremely high air flow, almost silent running and guaranteed 10,000 hr life. Measures only 62 x 62 x 22 mm. Current cost £32.00. OUR PRICE ONLY £12.95 complete with data.
MUFFIN-CENTAUR standard 4" x 4" x 1.25" fan supplied tested EX EQUIPMENT 240 v at £6.25 or 110 v at £4.95 or BRAND NEW 240 v at £10.50. 1000's of other fans Ex Stock. Call for Details Post & Packing on all fans £1.60

EPROM COPIERS

The amazing SOFTY 2 The "Complete Toolkit" for copying, writing, modifying and listing EPROMS of the 2516, 2716, 2532, 2732 range. Many other functions include integral keyboard, cassette interface, serial and parallel data i/o, UHF modulator, ZIF socket etc. ONLY £195.00 + PP £2.50.
"GANG OF EIGHT" intelligent Z80 controlled gang programmer for ALL single 5v rail EPROMS upto 27128. Will copy 8 27128 in typ. ONLY 3 MINUTES! Internal LCD display and checking routines for IDIOT PROOF operation. ONLY £395.00 + PP £3.00.
"GANG OF EIGHT PLUS" same spec. as above but with additional RS232 serial interface for down line loading data from computer etc. ONLY £445.00 + PP £3.00.
Data sheets on request.

DATA MODEMS

Join the communications revolution with our super range of DATA MODEMS with prices and types to suit all applications and budgets!!
Most modems are EX BRITISH TELECOM and are made to the highest standard for continuous use and reliability. RS232 interfaces are standard to all our modems, so will connect to ANY micro etc. with an RS232 serial interface.

DATel 2B see SPECIAL OFFER centre of this ad.
MODEM 13A, 300 baud. Compact unit only 2" high and same size as telephone base. Standard CCITT tones, CALL mode only. Tested with data. ONLY £45.00 + PP £4.50.
MODEM 20-1, 75-1200 baud. Compact unit for use as subscriber end to PRESTEL, MICRONET or TELECOM GOLD. Tested with data. £39.95 + PP £6.50.
MODEM 20-2, same as 20-1 but 1200-75 baud £99.00.
TRANSDATA 307A, 300 baud acoustic coupler. Brand new with RS232 interface. £95.00 + PP £4.50.
DACOM DSL2123 Multi Standard Modem, switchable CCITT or USA BELL 103 standard. V21 300-300, V23 75-1200, V23 1200-75 or 1200-1200 half duplex.
Auto answer via MODEM or CPU. CALL or ANSWER modes plus LED status indication. Dim 2.5" x 8.5" x 9". BRAND NEW fully guaranteed ONLY £268.00 + PP £4.50.
DATEL 2412 Made by SE LABS for BT this two part unit is for synchronous data links at 1200 or 2400 baud using 2780/3780 protocol. Many features include Auto answer, 2 or 4 wire working etc. etc. COST OVER £800. OUR PRICE £185.00.
DATEL 4800, RACAL MPS4800 high speed good condition £285.00 CARR £10.00

HOT LINE DATA BASE

DISTEL ©

THE ORIGINAL FREE OF CHARGE dial up data base 1000's of stock items and one off bargains.
ON LINE NOW - 300 baud, full duplex CCITT tones, 8 bit word, no parity.
01-679 1888

MAINS FILTERS

Cure those unnering hang ups and data glitches caused by mains interference.
SD5A As recommended by ZX81 news letter, matchbox size up to 1000 watt load £5.95
L2127 compact completely cased unit with 3 pin fitted socket Up to 750 watts £9.99

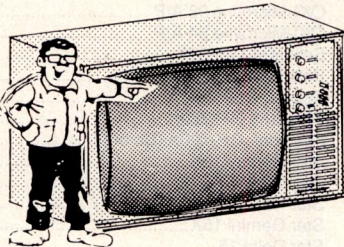
COMPUTER 'CAB'

All in one quality computer cabinet with integral switched mode PSU, Mains filtering, and twin fan cooling. Originally made for the famous DEC PDP8 computer system costing thousands of pounds. Made to run 24 hours per day the PSU is fully screened and will deliver a massive +5v DC at 17 amps, +15v DC at 1 amp and -15v DC at 5 amps. The complete unit is fully enclosed with removable top lid, filtering, trip switch, 'Power' and 'Run' LEDs mounted on Ali front panel, rear cable entries, etc. Units are in good but used condition - supplied for 240v operation complete with full circuit and tech. man. Give your system that professional finish for only £49.95 + Carr. Dim: 19" wide 16" deep 10.5" high. Useable area 16" w 10.5" h 11.5" d. Also available LESS PSU, with FANS etc. Internal dim 19" w 16" d 10.5" h. £19.95 Carriage & insurance £9.50

PRICE BARRIER SHATTERED ON 16" RGB CASED COLOUR MONITORS

A scoop purchase from a major London Hotel enables us to offer this special converted DECCA 100 COLOUR video TV at a super low price of £99.00!! Low enough to suit any budget!! Solid state modular construction, 16" high definition PIL tube, which eliminates convergence problems and our own special modification results in 80 + column text definition and picture quality not seen on monitors costing three times as much!! In fact we guarantee you will be delighted with this product, the quality has to be seen to be believed. Supplied complete and ready to plug direct to a BBC MICRO COMPUTER or any other system with a TTL RGB output. Other features include internal audio amp and speaker compact dimensions only. 52cm W x 34 H x 24 D, auto degaussing circuit, attractive teak finished case, 30 day guarantee.

ONLY £99.00 + £10.00 CARR.



Also available unmodified complete with mod data (Mod costs less than £12.00) £80.00.

SPECIAL 300 BAUD MODEM OFFER

Another GIGANTIC purchase of these EX BRITISH TELECOM, BRAND NEW or little used 2B data modems allows US to make the FINAL REDUCTION, and for YOU to join the exciting world of data communications at an UNHEARD OF PRICE OF ONLY £29.95. Made to the highest POST OFFICE APPROVED spec at a cost of hundreds of pounds each, the 2B has all the standard requirements for data base, business or hobby communications. All this and more!!

- 300 baud full duplex
- Full remote control
- CCITT tone standards
- Supplied with full data
- Modular construction
- Direct isolated connection
- CALL, ANSWER and AUTO modes
- Standard RS232 serial interface
- Built in test switching
- 240v Mains operation
- 1 year full guarantee
- Just 2 wires to comms. line

NOW ONLY £29.95

Order now - while stocks last. Carriage and Ins. £10.00

SAVE £250 SUPER PRINTER SCOOP



BRAND NEW CENTRONICS 739-2

ONLY £199

The "Do Everything Printer" at a price that will NEVER be repeated. Standard CENTRONICS parallel interface for direct connection to BBC, ORIC, DRAGON etc. Superb print quality with full pin addressable graphics and 4 type fonts plus HIGH DEFINITION internal PROPORTIONAL SPACED MODE for WORD PROCESSOR applications. 80-132 columns, single sheet, sprocket or roll paper handling plus much more. Available ONLY from DISPLAY ELECTRONICS at the ridiculous price of ONLY £199.00 + VAT Complete with full manual etc. Limited quantity - Hurry while stocks last.
Options: Interface cable (specify) for BBC, ORIC, DRAGON or CENTRONICS 36 way pig £12.50. Spare ribbon £3.50 each BBC graphics screen dump utility program £8.60. Carriage and Ins. £10.00 + VAT

HUNDREDS OF PRINTERS

EX STOCK FROM £49.00. Call Sales Office for Details.

1 only large CALCOMP 1036 AO 3 pen drum plotter and offline 915 magtape controller. Good working order. £2500.00.

DISK DRIVE SPECIALS

SIEMENS FDD-100-5 5 1/4" 40 track single sided. Ex new equipment tested, guaranteed working. Complete with data £75.00
SHUGART SA400 5 1/4" 35 track, single sided, Ex equipment, guaranteed working £55.00
SHUGART SA800, SA850 8" drives plus spares EX Stock call for prices.
Hard disk drives.
Large quantities of HARD DISK drives currently EX STOCK including:
DRE series 30 mb Front Load for DEC, NOVA etc
DIABLO 44/DRE 4000 A, B 5+5 mb cartridge drive
CDC HAWK 5+5 mb cartridge drive as new condition
CDC 9762 80 mb DEC RM03 compatible
PERTEC D3422 5+5 cartridge drive
Large quantities of spares and controllers available for S100, DEC, HONEYWELL, DATA GENERAL. Call sales office for details.
IN HOUSE disk drive refurbishing service - call for competitive quotations!!

FROM £295.00
FROM £995.00
FROM £795.00
FROM £2900.00
FROM £495.00

ADD VAT TO ALL PRICES

BUDGET RANGE VIDEO MONITORS

At a price YOU can afford, our range of EX EQUIPMENT video monitors defy competition!! All are for 240v working with standard composite video input. Units are pre tested and set for up to 80 col use on BBC micro. Even where MINOR screen burns MAY exist - normal data displays are unaffected.

1000's SOLD TO DATE

12" KGM 320-321, high bandwidth input, will display up to 132 columns x 25 lines. Housed in attractive fully enclosed brushed alloy case. B/W only £32.95 GREEN screen £39.95
24" KGM large screen black & white monitor fully enclosed in light alloy case. Ideal schools, shops, clubs etc. ONLY £55.00 Carriage £10.00

EX STOCK

DEC CORNER

PDP 1140 System comprising of CPU, 124K memory + MMU 16 line RS232 interface, RP02 40 MB hard disk drive, TU10 9 track 800 BPI Mag tape drive, dual rack system, VT52 VDU etc. etc. Tested and running. £3750.00

BA11-MB 3.5" Box, PSU, LTC £385.00
DH11-AD 16 x RS232 DMA interface £2100.00
DLV11-J 4 x EIA interface £310.00
DUP11 Sych. Serial data i/o £650.00
DQ200 Dialog - multi RK controller £495.00
DZ11-B 8 line RS232 mux board £650.00
LA36 Decwriter EIA or 20 ma loop £270.00
LAXX-NW LA180 RS232 serial interface and buffer option £130.00
LAX34-AL LA34 tractor feed £85.00
MS11-JP Unibus 32 kb Ram £80.00
MS11-LB Unibus 128 kb Ram £450.00
MS11-LD Unibus 256 kb Ram £850.00
MSC4804 Qbus (Equiv MSV11-L) 256 kb £499.00
PDP11/05 Cpu, Ram, i/o, etc. £450.00
PDP11/40 Cpu, 124K MMU £1850.00
RT11 ver. 3B documentation kit £70.00
RK05-J 2.5 Mb disk drives £650.00
KL8JA PDP 8 async i/o £175.00
MIBE PDP 8 Bootstrap option £75.00
V15 VDU and Keyboard - current loop £175.00
VT52 VDU with RS232 interface £250.00

1000's of EX STOCK spares for DEC PDP8, PDP8A, PDP11 systems & peripherals. Call for details. All types of Computer equipment and spares wanted for PROMPT CASH PAYMENT.

DISPLAY ELECTRONICS

All prices quoted are for U.K. Mainland, paid cash with order in Pounds Sterling PLUS VAT. Minimum order value £2.00. Minimum Credit Card order £10.00. Minimum BONA FIDE account orders from Government Depts., Schools, Universities and established companies £20.00. Where post and packing not indicated please ADD £1.00 + VAT. Warehouse open Mon-Fri 9.30-5.30. Sat 10.30-5.30. We reserve the right to change prices and specifications without notice. Trade, Bulk and Export

32 Biggin Way, Upper Norwood, London SE19 3XF
Telephone 01-679 4414 Telex 27924

MONITOR/PRINTER PACKAGES

FOR

SINCLAIR QL

★ NO INTERFACING PROBLEMS. JUST PLUG-IN AND GO!
★ ALL SYSTEMS FACTORY-TESTED BEFORE DESPATCH TO YOU!

PACKAGE DEALS

MONITOR	with PRINTER	Package Price
	Brother HR5 plus mains adaptor	£425
Microvitec	Epson RX80 F/T	£585
14" colour	Epson FX80	£725
1451DQ3	Epson FX100	£869
	Epson DX100	£745
	Brother HR15	£715
	Canon PW1080A NLQ	£649
	Epson JX80 colour	£895
	Canon PJ1080A colour	£835



'Z' GUARD £19.95
INCLUDING VAT
DELIVERY £2.00

MAINS FILTER FOR COMPUTER AND
SOFTWARE PROTECTION



Epson parallel printers supplied with RS232C I/F fitted
Canon printers supplied with Miracle Systems I/F. All
monitor and printer leads included. PRICES ARE
INCLUSIVE OF VAT. Add £12 for delivery.

(Illustrated: QL with Microvitec 1451DQ3
and Epson RX80F/T)

PRINTERS

Dot matrix:

Epson RS80	£260
RX80F/T	£290
FX80	£425
FX100	£620
LQ1500	£1125
JX80 colour	£625
Canon PW1080A NLQ	£375
PJ1080A colour	£529

Daisy Wheel:

Epson DX100	£495
Brother HR1	£675
HR15	£450
HR25	£795
HR35	£995

ACCESSORIES

Tractor feeders:

FX80
LQ1500
DX 100
HR1
HR15
HR25/35

Cut-sheet feeders:

DX100

Keyboards:

HR15
HR25/35
DX100
HR15
RS23C I/F
RS23C 2K buffer

MONITORS

Colour:

£35	Microvitec 1431 Std. res.	£199
£60	1431 MZ Spectrum	£235
£90	1451 Med. res.	£299
£95	1451 DQ. QL	£275
£90	1441 High res.	£506
£99	1431 PAL/Audio	£259
	1451 PAL/Audio	£375

Monochrome:

£250	Philips	
£250	BM7502 green	£92
£250	BM 7522 amber	£92
£170	Sanyo	
£170	DM2112	£90
£30	DM8112	£125
£65	Novex 12/800	£120

FOR PRINTERS/MONITORS—ADD £10 FOR DELIVERY

FOR ACCESSORIES—ADD £5 FOR DELIVERY

ZEAL MARKETING LIMITED

VANGUARD TRADING ESTATE, STURFORTH LANE, CHESTERFIELD S40 2TZ.
Tel: 0246-208555 Tlx: 547697

THE ASSOCIATION OF LONDON COMPUTER CLUBS
PRESENTS



RESERVE THE DATES NOW!
FOR THE CULMINATING EVENT
OF THE

**The Personal Computer
show for EVERYONE**
Further information from
PATRICIA SPILSBURY
01-303 8849



INTRODUCING THE
CPS 'ATP' RANGE
OF DATA SECURITY
PRODUCTS

ATP20 TAPE STREAMER

FOR USE WITH THE
IBM PC, XT AND AT.



OUTSTANDING FEATURES

- DISK IMAGE OR FILE IMAGE BACK-UP.
- NON-MIRROR IMAGE BACK-UP AUTOMATICALLY AVOIDS DEFECTIVE AREAS ON MEDIA.
- AUTOMATIC DISK REORGANIZATION ON DISK IMAGE BACK-UP.
- RESTORABLE TO ANY SUITABLY SIZED DISK EG., 8MB DATA FROM 20MB 'AT' TO 10MB 'XT'.
- SELECTIVE RESTORE ON DISK IMAGE AND FILE IMAGE BACK-UP.
- TRANSPARENT TRANSFER OF DATA BETWEEN IBM DOS 1.1, 2.0, 2.1, 3.0.
- DIRECTORY AVAILABLE FROM TAPE (DISK OR FILE IMAGE).
- TAPE INTERFACE AVAILABLE FROM A RANGE OF MULTI FUNCTION CARDS.
- INDUSTRY STANDARD DATA CARTRIDGE MEDIA.
- MANUFACTURED IN THE UK BY CPS DATA SYSTEMS LTD.



CPS Data Systems Ltd.

ARDEN HOUSE, 1102 WARWICK ROAD, ACOCKS GREEN, BIRMINGHAM B27 6BH ENGLAND

Hard disk...easy choice ...*FIREFLY*

Quest's *FIREFLY* subsystems offer from 10 to 115 Mbytes of Winchester disk benefits with optional tape back-up.

 *FIREFLY* runs on IBM PC, XT, AT and compatibles, VICTOR/SIRIUS, ACT APRICOT and F1, DEC RAINBOW, NEC APC, SINCLAIR QL and BBC.

 Supports MS-DOS (2.0), CP/M 86, Concurrent CP/M 86 and CP/M 68K

 Up to 28 Logical Disks per unit.

 Integral High Capacity Cartridge Tape Back-up

 Transparent to Applications Software

 Quickly and easily installed

 Complete with software, cables etc.

 NOW WITH ONE YEAR'S ON-SITE MAINTENANCE



Quest International
Computer Technology Ltd.

23 Wilton Road, Camberley, Surrey. GU15 2QW

For further details, demonstrations etc
call (0276) 681337

Dealer enquiries welcomed

quest

With software prices like this, Microware's hardware must be hard to pass up!

MULTI-USER PEGASUS £295.00

- Sales Ledger
- Purchase Ledger
- Nominal Ledger
- Invoicing
- Order Processing
- Stock Control
- Payroll
- Job Costing

PROJECT MANAGEMENT

- Hornet - £2750.00
- Harvard - £395.00

NEW LOTUS SYMPHONY £495.00

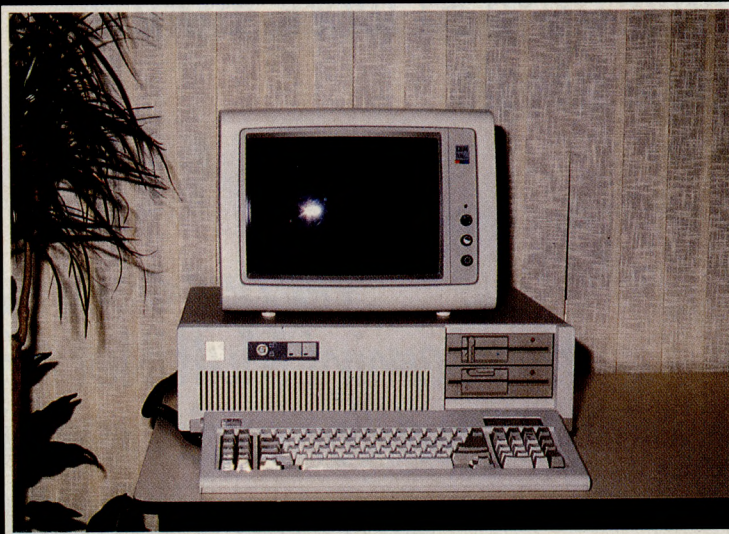
- New Lotus 123 Upgrade
- Spreadsheet
- Graphics
- Database
- Communications
- Word Processing

LOTUS 123 - £375.00

FRAMEWORK £475.00

VARIOUS SELECTION

- PC Tutor 2.0 - £41.00
- CBasic - £140.00
- Pascal/MT+ - £420.00
- Microsoft 'C' - £384.00
- Chess - £61.00
- Norton Utilities - £59.00
- Backgammon - £35.00
- Electronic Disk - £50.00
- Copy II pc - £29.00



BASIC SYSTEM

- IBM Personal Computer
64K RAM, Single sided Disk
Drive
Keyboard, Screen - £1567.00
- IBM Personal Computer
128K RAM, Twin 360K Drives
Keyboard, Screen - £2087.00

BUSINESS SYSTEM

- IBM Personal Computer
256K RAM, Twin 360K Drives,
Keyboard, Screen - £2299.00

Call for our full price list.

HARD DISK SYSTEM

- IBM Personal Computer
128K RAM, 10Mbyte Hard Disk,
Single 360K Floppy Drive
Keyboard, Screen - £3395.00

HERCULES GRAPHICS CARD

- Additional Cost only £215.00

COLOUR SYSTEMS

- Additional Cost only £405.00

DATABASE PACKAGES

- dBASE III - £475.00
- DMS - £195.00
- Delta - £495.00
- Everyman - £475.00
- Knowledge Man - £350.00

WORD PROCESSORS

- WordStar - £245.00
- Microsoft Word/Mouse - £340.00
- Multimate - £340.00
- Wordcraft - £340.00
- Word Perfect - £425.00
- Display writer II - £245.00

TELEX LINK

- Send telexes from IBM PC -
£1350.00

ARABIC IBM PC

- Conversion to Arabic - £590.00
- Arab Word Processor - £595.00

PRINTERS FROM £250.00

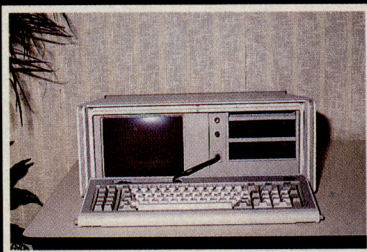
- Epson FX-80/FX-100/LQ1500
- Brother HR15/HR25
- NEC Spinwriter
- Sheet Feeders Available
- Typeface Catalogue Available
- Acoustic Hoods from £295.00

THE PROFESSIONALS

- Full training provided
- Free warranty Available
- Leasing deals arranged
- Highly competitive quotations
- Long and short term rentals



Apricot



IBM Portable



Compaq



Rainbow

637, Holloway Road
London N19 5SS 01-281 2431

14, Charles Street · Hanley
Stoke-on-Trent (0782) 269 883

*67, Westow St. · Upper Norwood
London SE19 · 01-771 6373

*2/4 Paul Street London EC2
01-247 8577

*Not IBM Authorized



MICROWARE

At long last, the end of the queue is in sight.

MultiNet—the Gemini low cost network system, provides up to 31 work stations supported by a single file server.

With a track record of proven reliability the Gemini MultiNet CP/M system is ideally suited for wide ranging industrial, commercial, educational and professional applications.

For as little as
£750 per workstation—
(EXC VAT) why queue?



Gemini Microcomputers



Anglia Computer Centre

88 St Benedicts Street,
Norwich NR2 4AB
Tel: (0603) 667032/3/4
Telex: 975201 ACOMP G

Unit 8, Wentworth Street,
Peterborough,
Cambridgeshire
Tel: (0733) 311755

Now open
25 Princes Street,
Ipswich IP1 1RJ
Tel: (0473) 214121

Now open
Parker's House
Regent Street,
Cambridge
Tel: (0223) 315633

SPECIALISTS IN BUSINESS COMPUTERS

BUSINESS COMPUTERS

Phone (0603) 667032/3 or 21117

APPLE, COMPAQ,
ALTOS, IBM*,
DEC, EPSON

* Complete with professional
back-up service *

● PETERBOROUGH

HOME COMPUTERS

Phone (0603) 26002/667031

BBC, ELECTRON,
COMMODORE 64,
SINCLAIR, AMSTRAD

* On special offer *
Call for Price £££

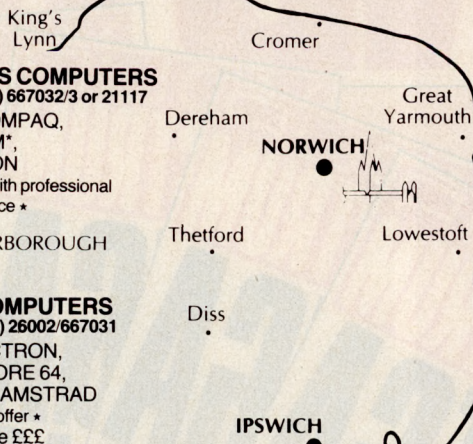
BOOKS AND STATIONERY CENTRE

Phone (0603) 29652

PROBABLY THE
LARGEST SELECTION
OF COMPUTER BOOKS
IN EAST ANGLIA

ACCESS AND BARCLAYCARD WELCOME

* IBM authorised dealer — IBM Personal Computer



BEST UK SOFTWARE PRICES?

- * Over 400 leading software packages (inc. Apple)
- * Independent advice in making your choice
- * Most formats. All programs latest versions
- * We offer a mail order service plus on-site demonstrations of many software packages in the Manchester/Sheffield/Nottingham/Derby area. For other locations please enquire.
- * Hardware selection/installation service.

SPECIAL OFFERS

DBASE II £239

WORDSTAR PROFESSIONAL £275

	List Price	Our Price		List Price	Our Price
Multimate	350	229	Volkswr't Del.	295	199
Symphony	550	429	Wordcraft	425	359
Framework	495	325	Milestone	250	199
Supercalc II	195	145	DMS Delta 2	495	375
Supercalc III	295	199	Think Tank	165	135
Crosstalk XVI	165	129	SideKick	50	45

LOTUS 1-2-3 £279

now also available at our new lower price for

SIRIUS and APRICOT

A.C.T., COMPAQ, NORTHSTAR COMPUTERS

SAGE ACCOUNTS £259

We specialise in accounting software and can therefore advise you on the best package to suit your business. One of the systems we support is

PEGASUS

All prices exclude V.A.T. POST FREE on orders over £150. DEALER AND CONSULTANT ENQUIRIES WELCOME. Please phone or write for our comprehensive price list.

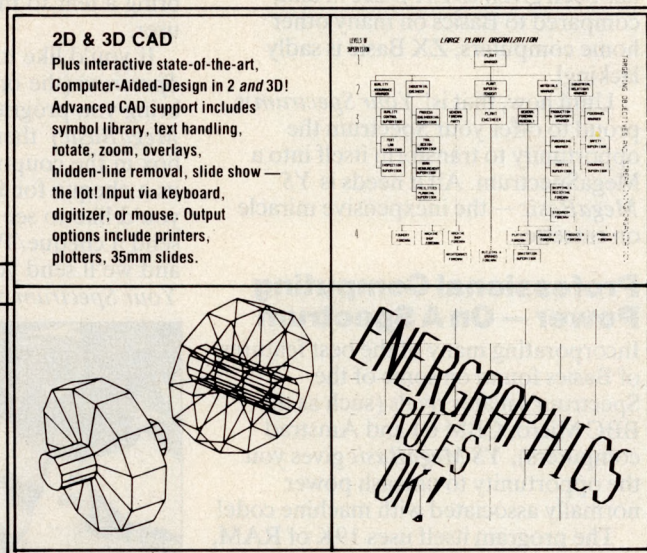
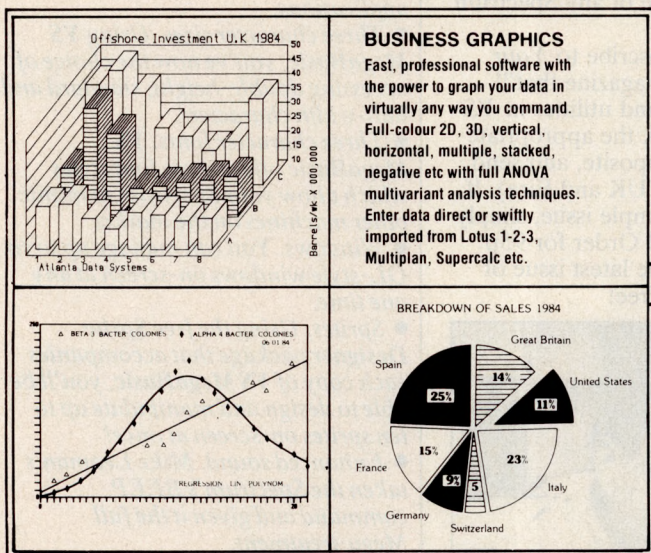
TriSoft Ltd

INDEPENDENT MAIL ORDER DISTRIBUTORS OF QUALITY SOFTWARE

Castle House, Lea, Matlock, Derbyshire DE4 5GL. Telephone: 062 984 383/719

Energize Your Graphics

ENERGRAPHICS™



Just £350.00 + VAT Order now from

What the press says —

"Impressive . . . Versatile . . . Remarkably easy to use . . . A bargain

EnerGraphics requires an IBM PC, XT, AT, 3270 or any compatible, 192K RAM and colour graphics board.



ATLANTA DATA SYSTEMS
350/356 Old Street, London EC1V 9DT
Telephone 01-729 1411

THE END OF

Single Letter Keyword Entry ...

Three Character Fonts ...

Three Character Sizes ...

QL-Style Windows ...

Named Procedures ...

Stippled Characters ...

64 Column Text ...

Sprites Galore ...

... Upgrade Your Spectrum
To A MegaSpectrum—NOW!

ONLY £9.95!



It all began with the ZX80 ...the first personal computer retailing for under £100. Next, Sinclair Research announced the ZX81, offering memory expansion to 16K. Completing the ZX series of micros came the Spectrum and its big brother, the Spectrum+.

Although the hardware has been modified extensively, not much thought has been given to ZX Basic ... and, compared to Basics on many other home computers, ZX Basic is sadly lacking!

Until now, that is! *Your Spectrum* is proud to offer your Spectrum the opportunity to transform itself into a MegaSpectrum. All it needs is *YS MegaBasic* — the inexpensive miracle on cassette.

Professional Computing Power — On A Spectrum

Incorporating many of the best features of Basics found on some of the Spectrum's major rivals (such as the BBC Micro, CBM 64 and Amstrad computers), *YS MegaBasic* gives you the opportunity to unleash power normally associated with machine code!

The program itself uses 19K of RAM, leaving you with 22K to write your own *YS MegaBasic* programs. It may seem as though you've lost a lot of memory, but you'll find you don't need so much code to create on-screen effects with *YS MegaBasic*. Anyway, when was the last time you wrote a program larger than 22K?

Your Spectrum Presents ...

It's no fluke that a mere computing magazine gets to make such a real contribution to the Spectrum home micro. Here at *Your Spectrum*, we pride ourselves on accurate reporting, powerful 'no punches pulled' reviews and a list of contributors that would bring a tear to the eye of any Spectrum user.

If you'd like to subscribe to *Your Spectrum* (the only magazine that'll bring you programs and utilities in *YS MegaBasic*) then tick the appropriate box in the coupon opposite, and send us a cheque for £12 (UK and Eire). If you'd like to see a sample issue, simply send a cheque/Postal Order for 95p and we'll send you the latest issue of *Your Spectrum* post free!



The man behind *YS MegaBasic* — Mike Leaman.

KEY FEATURES OF YS MEGABASIC

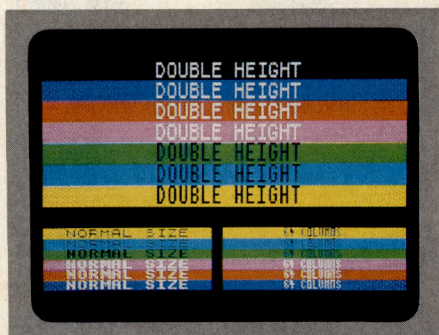
- An extended command set. *YS MegaBasic* recognises over 35 new commands, which allow you to access the new features available as well as providing the opportunity to make more of the commands in standard ZX Basic.
- 64 columns of text. Useful for wordprocessing and database applications.
- Three character sizes. Using *YS MegaBasic*, you've now the choice of accessing double-height, standard and half-width characters.
- Three character fonts. *YS MegaBasic* offers three font styles which allow your Spectrum to mimic other machines on the market.
- Windows. You can manage up to six QL-style windows on-screen at any one time.
- Sprites. Using the free *Sprite Designer* package that accompanies each copy of *YS MegaBasic*, you'll be able to design and manipulate up to ten sprites on-screen at once!
- Enhanced sound. Mike Leaman's taken the Spectrum's BEEP command and given it the full Mega-treatment.
- Procedures. Structure your programs and define new commands — it's all here!
- Stippled characters. QL-style stipples allow you to mix colours on-screen to give interesting colour effects.

ZX BASIC?

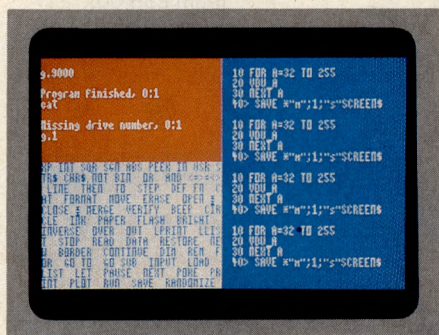
Sprite Designer — Free With Each Copy Of YS MegaBasic!

Included in the *YS MegaBasic* package, you'll find a special utility program called *Sprite Designer*. Written by Mike Leaman in *YS MegaBasic*, this 11K program is designed to help you create sprites on the Spectrum.

You can have up to ten sprites on-screen at any one time, but if you're careful with memory you can get more!



Here, *YS MegaBasic* is showing off its multifarious character sizes and fonts. Each window contains text in three different sizes: double height, normal height and that used for 64-columns; double height and standard text can be output in three different fonts.



The screen format for the input/output of *YS MegaBasic*. Three windows are provided for input, LISTing and RUNning programs; under software control, each window's size and purpose can be changed to suit individual requirements.

YS MegaBasic
Available only by
mail order and only
from

Your Spectrum

Your Spectrum, YS MegaBasic
Offer, Sportscene Specialist Press, 14
Rathbone Place, London W1P 1DE.

**YOUR
SPECTRUM**

YS MEGABASIC PRIORITY ORDER FORM

How To Order YS MegaBasic

Just fill in the order form below
(or a photocopy of same) and
send it off to:

**Your Spectrum,
YS MegaBasic Offer,
Sportscene Specialist Press,
14 Rathbone Place,
London W1P 1DE.**

For each copy of *YS MegaBasic*,
you'll need to enclose a cheque/
Postal Order for £9.95, made
payable to Sportscene Specialist
Press.

And while you're tuning up
your MegaSpectrum, why not take
a peek at the magazine that
started it all — *Your Spectrum*.
You can buy yourself a year's

subscription for just £12 (UK and
Eire) £15 (Europe) and £25
(Worldwide) . . . or, if you just
send us a cheque/Postal Order for
95p, we'll make sure you get a
pristine copy of the latest issue —
post free!

There's Nothing As Good As YS MegaBasic!

YS MegaBasic is probably the best
way to upgrade your Spectrum —
give your Spectrum real
computing power . . . for just
£9.95.

Be one of the first to transform
your Spectrum into a
MegaSpectrum with the
inexpensive miracle on cassette —
YS MegaBasic.

QTY	ITEM	PRICE	SUB-TOTAL
.....	☐ YS MEGABASIC	£9.95	£
.....	☐ YS SUBSCRIPTION (UK & EIRE)	£12	£
.....	☐ YS SUBSCRIPTION (EUROPE)	£15	£
.....	☐ YS SUBSCRIPTION (WORLDWIDE)	£25	£
.....	☐ YS — SAMPLE COPY	95p	£
		TOTAL	£

Name

Address

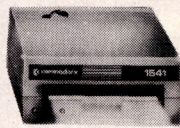
Postcode

Phone Age

Please allow 28 days for delivery.

MAGAZINE HEALTH WARNING

Using scissors to cut this coupon may prove hazardous to this issue's health. Why not use a photocopy instead?



**£575.00
INCL. VAT**

COMMODORE PLUS 4 + 1541 DISC DRIVE + IMPEX COMPANY PAC 1-2-3

The first business package combination ever assembled for the small business. Based on the new Commodore Plus 4 it combines the Plus 4's versatile integral word processing, spreadsheet, file manager and business graphics facility with Impex's complete business accounting and stock control system, containing sales ledger, purchase ledger, invoicing, stock control and nominal ledger – all for just £575.00.



**DISKETTES, CASSETTES, LIFETIME
GUARANTEE AGAINST
MANUFACTURERS DEFECTS**



5 1/4" Disks	SS/DD	SS/DD	DS/DD
Newtrends (packs of 10)	13.00	15.00	18.00
Newtrends (each)	1.50	1.70	1.90
Newtrends, DBL Sides/DBL Density (packs of 10 only)			
For Commodore 1541 drive, Apple II, IIE, IIE, Franklin 1-4 Packs £19.60			
5 1/4" Disks		SS/DD	DS/DD
BASF (Qualimetric) 48 tpi		16.50	19.60
3M 48 tpi		16.50	19.60
Dynas 95 tpi		24.50	30.50
ZIDEX - NASHUA - CONTROL DATA - FUJI - SONY - VERBATIM			
Available at Discount Prices on request - Schools apply on official letterhead for Super Discount.			
Cassettes	Per 10	Per 100	Reel to Reel Data Cartridges (As Illustrated)
C-10	2.90	25.00	C-10 4.50 43.00
C-15	3.00	26.00	C-15 4.75 45.00
Accessories			
Library Cases 2.80			Lock Box (40 Diskettes) 18.50
			Lock Box (80 Diskettes) 22.50

COMPARE OUR PRICES BOTH WAYS

COMPUTERS			OTHER EQUIPMENT			PRINTERS - DAISY WHEEL		
	Inc VAT	Ex VAT		Inc VAT	Ex VAT			
Commodore			Commodore			Brother		
CBM 64	188.00	159.80	1701 Colour Monitor	195.00	165.75	HR1 (P) (16 CPS)	343.85	299.00
+4	288.00	244.80	1530 Cassette Unit	39.00	33.15	HR15 (P) (30 CPS)	402.50	350.00
8096	776.25	675.00	1541 Disk Drive	195.00	165.75	HR25 (P) (35 CPS)	690.00	600.00
Sinclair			Dynarec			HR35 (P) (35 CPS)	931.50	810.00
QL	373.75	325.00	12" IBM PC Monitor	201.25	175.00	CE-51	419.75	365.00
Apricot			Sanyo			Diablo		
File - 128K RAM 1 x 315K Drive	862.50	750.00	DM2112/Vocal Monitor	74.75	65.00	620 (RS232) (20 CPS)	810.75	705.00
CPM86/Personal Basic/DR/Logo & Tutorial			CD3115 14" HR Monitor	508.30	442.00	630 ECS (40 CPS)	2012.50	1750.00
Sanyo			DMC 7650 IBM/Apricot Monitor	P.O.A	—	Epson		
MBC 550-128K RAM 1 x 160K Drive - WordStar - CalcStar - MS DOS - Basic - plus Monitor	736.00	640.00	Zenith			DX-100 (P) (20 CPS)	476.10	414.00
MBC 550 - 128K RAM - 2 x 160K Drives - WordStar - CalcStar - InfoStar - MS DOS - Basic - Monitor	914.25	795.00	QVT 122 12" Monitor	97.75	85.00	Qume		
MBC 755 - 256K RAM - 2 x 360K Drives - WordStar - CalcStar - MS DOS 2 - 11 - Colour Monitor - Totally IBM Compatible	2472.50	2150.00	QVT 102A 14" Monitor	517.50	450.00	QU 512P (20 CPS)	540.50	470.00
Cee Data			QVT 211GX Monitor	1150.00	1000.00	QU 1140 W/O/T (40 CPS)	1357.00	1180.00
PC301 - 64K RAM - 2 x 380K Drives - Monochrome Swivel/Tilt Screen - K2 Keyboard - CPM 80 - V2 - 2 - 36 Programmable Keys	—	1735.00	Cumana			Silver Reed		
PC401 - 256K RAM - 2 x 360K Drives - 16 bit 8088 - 8 Universal Expansion Slots - Parallel Printer Port - RS232 Port - Automatic Clock Calendar - IBM Compatible Monochrome and Colour Board - MS-DOS V2 - 11 - CPM 86 - Reset Button - Tilt/Swivel Screen	—	2100.00	CSX100 Disk Drive (No PSU)	112.41	97.75	SR 400P (10 CPS)	987.50	250.00
			CSX100 (W/ PSU)	142.83	124.20	SR 550P (19 CPS)	517.50	450.00
			CD200K 80 Track Drive	255.30	222.00	TEC		
			CD400S (W/ PSU)	394.00	281.75	TE040 P or S (40 CPS)	1028.10	894.00
						TE055 P or S (55 CPS)	—	—
			PRINTERS - DOT MATRIX					
			Admate					
			ADM-80 FT (80 CPS)	186.30	162.00			
			Anadex					
			DP 9001B (150 CPS)	941.85	819.00			
			WP 6000 (330 CPS)	2070.00	1800.00			
			DP 6500B (500 CPS)	2317.25	2015.00			
			Commodore					
			MPS 801 (50 CPS)	195.00	165.70			
			Brother					
			HR5 Portatriter Serial	138.00	120.00			
			HR5 for CBM 64/Vic 20	150.00	127.50			
			EP44	218.50	190.00			

NEWTREND TECHNOLOGY LTD, 35 NORTH AUDLEY STREET, LONDON W1Y 1WG.
I enclose Cheque/P.O. for £

Please send me

Name

Address

Please add £1.50 p&p for orders under £20 (Europe £2.00). Airmail at cost.
Make Cheques/P.O.'s payable to NEWTREND TECHNOLOGY LTD.

ARE YOU BUYING A BUSINESS COMPUTER? ARE YOU BEWILDERED BY THE CHOICE? SOFTWARE ADVISORY SERVICES CAN HELP!

We are qualified accountants specialising in the installation of business computers.

We offer a unique package which includes:

- * Appraisal of your present accounting system.
- * Independent advice on which hardware and software will be best suited for your requirements.
- * Supervision of the installation.
- * Transfer of data from the manual system to the computer.
- * Training of staff.
- * Guarantee that all audit and accounting requirements will be met.
- * Full back-up service.
- * **FINALLY, AND MOST IMPORTANTLY, WE GUARANTEE THAT YOUR SYSTEM WILL OPERATE SATISFACTORILY.**

Save yourself a headache - call the company that gives you a guarantee.

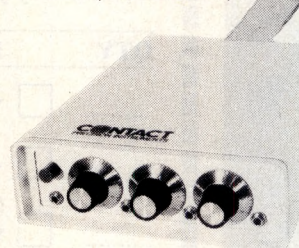
SOFTWARE ADVISORY SERVICES LTD
21 Napier Place, London W14 8LG
01-603 1452

Introducing

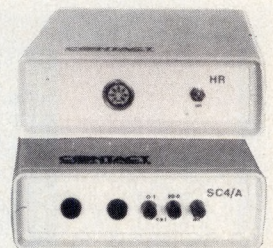
micro couple

the low cost link to your equipment or gadgetry

Micro Couple Interface
(from £95.00)



Micro Coupler Units
(from £55.00)



Use MCI
with:-



commodore 64 BBC

Micro Couple Interface connects directly with your computer to provide **8 analog inputs and digital control lines**. A 25 way socket connects with the range of Couplers for particular measurement or control purposes. MCI can additionally provide an **interval timer, a battery backed clock calendar and a full parallel IEEE 488 interface**.

Coupler Units currently available include:-

- DC voltage control (for motors etc.)
- Mains controller (for lighting etc.)
- Frequency Generator
- Temperature measurement
- Strain gauge measurement
- Physiology measurement

CONTACT
PRECISION INSTRUMENTS

4 King Street, London W6 0QA. Telephone: 01-741 8398/01-464 8724

SOFTWARE FROM METASCYBE

ICL C03
Our < **CONNECT C03** > Protocol Converter Unit,
clusters from three to ten (different) microcomputer systems
on One ICL C03 line. Provides interactive
and bulk transfer facilities.

COMPLETE RANGE

ALL FORMATS

BEST PRICES

COMMUNICATIONS

ASCOM	130.00
BSTAM	130.00
BSTMS	130.00
CROSSTALK	130.00
ICL/IBM PROTOCOL EMULATION	POA
METATEX - Telex	POA

DATABASE MANAGEMENT

AUTOCODE	200.00
CARDBOX	140.00
CARDBOX PLUS	290.00
COMPSOFT DMS	176.00
DATASAR	158.00
DBASE II	320.00
DBASE III	450.00
FRAMEWORK	450.00
DMS DELTA	446.00
EASYFILER	241.00
EVERYMAN	428.00
FMS-80	446.00
FRIDAY!	175.00
IBM PC PERSONAL DATABASE	76.00
INFOSTAR	265.00
INFOSTAR PLUS (STARBURST)	338.00
KNOWLEDGEMAN	315.00
PERFECT FILER/PERFECT CALC	413.00
PERSONAL PEARL	171.00
QUICKCODE	185.00
REPORTSTAR	189.00
RESCUE	265.00
SUPERFILE	216.00
SUPERFILE (COMPLETE SYSTEM)	450.00
SUPERFORMS	131.00
SUPERTAB	131.00
dGRAPH	185.00
dUTIL	65.00

MANAGEMENT CONTROL SYSTEM

GRAPHPLAN (IBM PC)	248.00
MATHEMAGIC	70.00
MICROSTAT	248.00
MILESTONE	185.00
OPTIMIZER	110.00
PERTMASTER	585.00
SNAP	581.00
STATPACK	311.00
STATS-GRAPH	117.00

BUSINESS GRAPHICS

DATAPLOT PLUS	195.00
---------------	--------

FINANCIAL SPREADSHEET

CALCSTAR	104.00
EASYPLANNER	151.00
FASTPLAN	473.00
MICROMODELLER (8 BIT)	230.00
MICROMODELLER (16 BIT)	536.00
MICROPLAN	311.00
MULTIPLAN	143.00
OZ-MANAGEMENT CONTROL	315.00
PEACHCALC	86.00
PERFECT CALC	167.00
PLANNERCALC	77.00
PLANSTAR	446.00
SUPERCALC	121.00
SUPERCALC 2	180.00
SUPERCALC 3	265.00

TRAINING HELP

All the ATI trainers for popular packages	POA
---	-----

UTILITIES

ACCESS MANAGER (CP/M-80)	193.00
ACCESS MANAGER (16 BIT)	257.00
C-PAC	90.00
CIS-ANIMATOR	203.00
CLIP (8 & 16 BIT)	86.00
DESPOOL (CP/M-80)	36.00
DISK DOCTOR (8 & 16 BIT)	67.00
DISK-EDIT	65.00
DISPLAY MANAGER (CP/M-80)	257.00
DISPLAY MANAGER (16 BIT)	322.00
DR-ASSEMBLER TOOLS PLUS	POA
EDIT TEXT EDITOR	79.00
FILESHARE	225.00
FORMS-2	99.00
KOPY	68.00
LEVEL II-ANIMATOR	428.00
M-SORT	129.00
M-SORT (MS-DOS)	129.00

BUSINESS ACCOUNTING

Entire ranges of Peachtree Financial Director & Image	POA
---	-----

UTILITIES

MENU MASTER	120.00
PROGRAMMER'S UTILITIES	128.00
QUICKSCREEN - for CBASIC	90.00

QUICKSCREEN - for FMS-80	95.00
QUICKSCREEN - for MBASIC	95.00
SID/ZSID-80	64.00
SID/ZSID-86	96.00
SORT FACILITIES (MSORT)	134.00
SOURCEWRITER	POA
SPP (CP/M-80)	129.00
SPP (CP/M-86)	160.00
STARBURST	113.00
SUPERSORT I	131.00
SUPERSORT II	113.00
SUPERVYZ	94.00
ZIP FOR CBASIC & MBASIC	144.00
ZIP FOR CBASIC OR MBASIC	104.00

WORD PROCESSING

EASYWRITER II (ESPELL & EMAIL)	265.00
EASYWRITER I (SPELL & MAIL)	160.00
MAILMERGE	130.00
MULTI TOOL WORD (MS-DOS)	269.00
MULTI-TOOL WORD+MOUSE (IBM-PC)	305.00
PEACHPACK	315.00
PEACHTEXT	158.00
PERFECT SPELLER	135.00
PERFECT WRITER	265.00
PERFECT WRITER/PELLER	383.00
SPELLBINDER	288.00
SPELLING PROOFREADER	86.00
SPELLSTAR	130.00
STARINDEX	104.00
SUPERWRITER	265.00
WORDSTAR	265.00
WORDSTAR PROFESSIONAL	482.00
WORDSTAR/MAILMERGE	350.00

LANGUAGES

ADA	180.00
BUSINESS BASIC COMP.	422.00
C-COMPILER	302.00
C-COMPILER (CP/M-80)	167.00
CBASIC (CP/M-80)	96.00
CBASIC (CP/M-86)	217.00
CBASIC (PC-DOS)	130.00
CBASIC COMPILER (CP/M-80)	322.00
CBASIC COMPILER (16 BIT)	385.00

CIS-COBOL	375.00
CORAL 66	743.00
DR-C COMPILER (16 BIT)	226.00
FORTAN IV & RATFOR	324.00
LEVEL II COBOL	775.00
MACRO-ASSEMBLER	143.00
MICROSOFT BASIC COMP	265.00
MICROSOFT BASIC INT.	251.00
MICROSOFT C COMP (MS-DOS)	359.00
MICROSOFT COBOL COMP	494.00
MSOFT FORTRAN COMP (MS-DOS)	251.00

MSOFT FORTRAN COMP (CP/M-80)	359.00
------------------------------	--------

MSOFT PASCAL COMP (MS-DOS)	206.00
MULISP/MUSTAR (CP/M-80)	132.00
MULISP/MUSTAR (PC-DOS)	167.00
MUMATH/MUSIMP (CP/M-80)	167.00
MUMATH/MUSIMP (PC-DOS)	198.00
PASCAL MT+ (CP/M-80)	226.00
PASCAL MT+ (CP/M-86)	424.00
PASCAL MT+ (PC-DOS)	284.00
PASCAL/M (CP/M-80)	265.00
PASCAL/M (CP/M-86)	356.00
PERSONAL BASIC	96.00
PERSONAL COBOL	225.00
PL/1 (CP/M-80)	353.00
PL/1 (16 BIT)	481.00
PRO-FORTRAN	198.00
PRO-PASCAL (CP/M-80)	198.00
PRO-PASCAL (16 BIT)	288.00
SUPERSOFT BASIC COMP (16 BIT)	200.00
SUPERSOFT C COMPILER	165.00
SUPERSOFT C COMPILER (16 BIT)	300.00
SUPERSOFT FORTRAN (8 & 16 BIT)	255.00
SUPERSOFT LISP	90.00

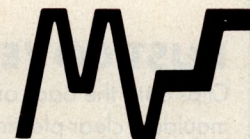
ALL-IN-ONE

LOTUS 1-2-3	370.00
SYMPHONY	POA
FRAMEWORK	POA
EXCHANGE	POA
OPEN ACCESS	POA
DECISION MANAGER	POA

Please Ring or Write to: Tom Hooke or Roger Harvey

TEL (01) 606 6865

METASCYBE SYSTEMS LTD,
78 LONG LANE, LONDON EC1A 9ET.



Post & Packing charge at cost. Prices do not include VAT. Prices are subject to change.

ALL PURCHASES SUBJECT TO OUR TERMS & CONDITIONS OF SALE.

Some of the systems we support (plus all 8 inch SS/SD IBM 3740 compatible formats):

ACT Apricot; ACT Sirius 1; Almarc series 8; Altos 5.25; Apple CP/M-80 16 sector; Basic/4; British Micro Mimi 802; Comart Communicator; Compaq; Cromemco; DEC Rainbow; DEC VT-100; Decision 1; Eagle/AVL; Epson QX-10; Future Computers FX-10; Future Computers FX-30; HMS Minstrel; Hewlett Packard; Hyperion; IBM PC; ICL PC1 (DRS-20); ICL PC (Rair Black Box compatible) JC CP/M; JC Turbodos; KAY-Pro; Logica Vitesse; Micro Decision; Nano; NEC PC 8000; NEC APC; North Star Advantage; North Star Horizon; Osborne 1; Otrona; Rair Black Box/Nano; Research Machines 380Z; Samurai; Sanyo 1000/1150; Sanyo 1250/4050; Sanyo 2000; Seiko; Shelton Signet SS; Shelton Signet DS; Superbrain SD; Superbrain QD; Superbrain Jnr; Televideo TS802/803/1600; Torch; Victor 9000; Xerox; Zenith Z100

MICROPRIDE LTD.

ORIC JOYSTICK

Top fire button and side fire button for use with Commodore 64, Vic 20 and Atari

£9.95

Oric IJK Joystick interface for use with Oric/Atmos

£11.50

Joystick interface for use with Spectrum/ZX81

£7.95



TRACKBALL

Improve your scores and skills with the Computek Trackball suitable for use with Commodore 64, Vic 20 and Atari

£17.95

Trackball interface for Oric/Atmos

£11.50

Trackball interface for Spectrum/ZX81

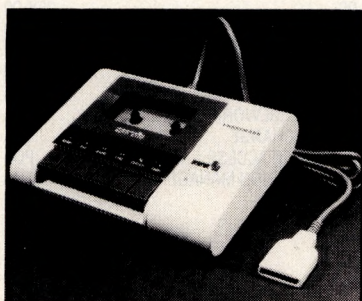
£7.95



COMPUTEK JOYSTICKS

For use with the BBC Computer. Metal shaft, 2 fire buttons

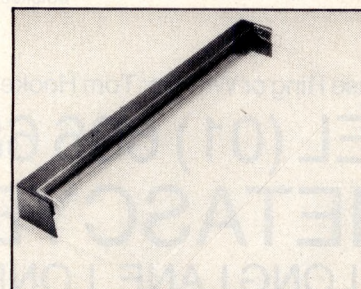
£12.95



PM C16 CASSETTE DATA UNIT

Designed for use with Commodore +4, Commodore 64 and Vic 20. This cassette unit is a device for storing and recalling computer programs on ordinary cassette tapes. It can be used for saving programs you have written and want to recall for later use. It can also be used to read pre-recorded programs that you have purchased.

£24.95



DUST COVER

Clips onto the back of the Commodore 64. Pivots up to allow use of keyboard, fully moulded, clear plastic dust cover.

£7.95

TRADE ENQUIRIES WELCOME

ORIC ATMOS £125.95

ORIC DISC DRIVE..... £225.00

ORIC PRINTER £129.95

ORIC MODEM AND
INTERFACE..... £99.95

Please send me the following
I enclose my cheque/P.O. made payable to:

MICROPRIDE LTD for £.....

NAME

ADDRESS

* ALL PRICES INCLUDE POSTAGE & PACKING *

MICROPRIDE LTD.
UNIT 16, SHIPYARD INDUSTRIAL ESTATE,
BRIGHTLINGSEA, ESSEX CO7 0AR.

KIRKLANDS MICRO-WAVE LTD PRINTER

SUPER DEAL

Simply the lowest price
printer suppliers
anywhere in the UK

The FABULOUS **Star** PRINTERS

gemi-10X from STAR
write your
language. Simple, Fast, Economical. Gemini-10X
at the standard STAR price. 120 characters per
second and compatible with everything from
APPLE to ZENITH. A proof-sheet built to print
out over 100 million characters and designed for
simple replacement. Clear printing of inter-
national or individually programmable characters.

The power behind the printed word.



delta-10 from STAR has
standards which others
call options. Standards at no extra cost: Serial
and parallel interfaces, 8K-Byte buffer, the macro-
instruction direct to the printer and two times
96 freely definable characters. Delta-10 also fits
virtually over empty spaces at high speed.
Delta-10 prints 160 characters per second and is
compatible with everything from APPLE
to ZENITH.

The power behind the printed word.



radix-10 from STAR - the super fast
letter quality printer. Radix-10
the multifunction printer that includes plotting
capability. Radix-10 prints 200 characters per second and
offers all the flexibility the modern day computer
demands. Radix-10 is the all-round printer that sets new
standards: 16 K-Byte buffer, interface - serial and parallel,
pique and feed-back, international character sets and
easy programming of individual definable characters.

The power behind the printed word.



Gemini-10X	£215.00	Delta-10X	£343.00	Radix-10X	£448.00
Gemini-15X	£310.00	Delta 15X	£437.00	Radix-15X	£549.00
(136 Column)		(136 Column)		(136 Column)	

IBM versions of Gemini and Delta in stock — please phone

Star Printers are Epson Compatible

EPSON Price Breakthrough

RX80	£210.00	FX80	£360.00	DX100 (Daisy)	£410.00
RX80FT	£245.00	FX100	£465.00	LQ1500	£920.00
RX100	£375.00	JX80	£483.00	HI80 Plotter	£350.00
		(New 4-Colour)			

We also stock all printer peripherals — call us for the best prices in the UK

Beautiful BROTHER Printers

HR5	£148.35	HR35	£793.50	New 2024	£900.00
HR15	£378.35	New M1009	£178.25	NLQ Printer	
HR25	£631.35	EP44	£212.75	We can now offer the fabulous TEC Disk Drives, suitable for the BBC Micro (including leads + format + manual) 100K	£125.00

Ring for other details

**All prices include VAT. P&P Next day: £10.00 or £5.00 for normal
service. Educational orders welcome**

All products carry a FULL 1 YEAR WARRANTY. Shop hours: 9.00-5.30 Mon-Sat

KIRKLANDS BUSINESS SYSTEMS LTD
KIRKLAND HOUSE, 27 CITY ROAD, STOKE
Tel: 0782 414333

Video Interface

Apricot - Sirius - Victor users

Now you can drive composite video monitors and projection systems from your micro, whilst retaining use of the original monitor. Industry standard BNC output. No internal fitting to the micro required. Ideal for: Training, demonstrations and seminars or any application requiring extra remote displays.

Standard model £89.00 excl. VAT.

FURTHER DETAILS ON REQUEST. SPECIFY SIRIUS, VICTOR OR APRICOT

Sirius B

A bi-monthly disk based magazine for Sirius-Victor micros containing useful software, news, technical topics, assembler routines and basic routines. In fact something for every Sirius-Victor owner and user in every issue.

1985 Subscription £120.00 excl. VAT.

FURTHER DETAILS AND SUBSCRIPTION FORM ON REQUEST

Micro Visual Research

**58 Beachcroft Road, Wall Heath
Kingswinford, West Midlands
DY6 0HX**

Tel: Kingswinford (0384) 273047

THE INSTITUTION OF ANALYSTS & PROGRAMMERS



An association which is widely recognised and respected, endorses the status of its members, protects and promotes their interests, assists their careers and encourages their ethical standards is the foundation of every profession.

The Institution of Analysts & Programmers is the leading association for those who use, develop and organise systems analysis and computer programming for Commerce, Industry or Public Service as a principal or supplementary part of their professional life. Awareness of the Institution and the high regard accorded to its members has brought inquiries and applications from over forty independent countries and states.

The essential qualification for election is practical experience but grading allowances are made for degrees, diplomas and course certificates of recognised universities and training organisations and for memberships of other professional associations and learned bodies. A guide to membership requirements and gradings may be requested by telephone or letter addressed to the Applications Department.

01-898 2385

The Institution Of Analysts & Programmers
GIBSON HOUSE, FOURTH CROSS ROAD, TWICKENHAM
MIDDLESEX, TW2 5EL, ENGLAND



**Appointed Dealers for
ITT XTRA, PEGASUS, LOTUS**

We offer a complete service including comprehensive demonstrations, installation and training. On site maintenance contracts can be arranged.

BUSINESS COMPUTERS

Apricot F1e prices start from	895
Apricot Portable prices start from	1695
Apricot PC prices start from	1395
ITT XTRA120 128K 2xD/S diskettes	1737
ITT XTRA130 256K 1xD/S diskette 1x10MB fixed	3063

PRINTERS

Brother M-1009	174	Epson RX100	420
Epson RX80	226	Epson FX100	520
Epson RX80F/T	260	Juki 2200	260
Epson FX80	399	Juki 6100	373

All prices exclude VAT

Business software available including Pegasus, Lotus, Multiplan, Volkswriter, and many others.

We accept official orders from UK Government and Educational Establishments.

Export enquiries welcome.

Leasing available. Ask for written details.

Showroom opening hours: MON-SAT. 9.00am-5.30pm

MIRAGE MICROCOMPUTERS LTD

24 Bank Street Braintree Essex CM7 7UL
Telephone Braintree (0376) 48321

INCREASE YOUR SYSTEM'S SPEED WITH ONE SIMPLE PLUG IN UNIT

INTERFACES

IEEE TO PARALLEL EXCLUDING P.S.U. IF1200	£65.95
IEEE TO PARALLEL IF1210	£69.95
IEEE TO RS232 IF1310	£79.95
PARALLEL TO RS232 IF2310	£79.95
RS232 TO PARALLEL IF3210	£69.95
CBM 64 TO PARALLEL IF3210	£59.95

PRINTER BUFFERS

EXTERNAL SPOOLERS (MAINS POWERED)

INPUT	OUTPUT	
PARALLEL	PARALLEL 8K BIF2210	£79.95
PARALLEL	PARALLEL 16K BIF2211	£89.95
PARALLEL	PARALLEL 32K BIF2212	£99.95
PARALLEL	PARALLEL BIF2213	£129.95
PARALLEL	RS232 8K BIF2310	£99.95
PARALLEL	RS232 16K BIF2311	£109.95
PARALLEL	RS232 32K BIF2312	£119.95
PARALLEL	RS232 64K BIF2313	£149.95
RS232	RS232 8K BIF3310	£99.95
RS232	RS232 16K BIF3311	£109.95
RS232	RS232 32K BIF3312	£119.95
RS232	RS232 64K BIF3313	£149.95
RS232	PARALLEL 8K BIF3211	£109.95
RS232	PARALLEL 32K BIF3212	£119.95
RS232	PARALLEL 64K BIF3213	£149.95

INTERNAL SPOOLERS FOR EPSON PRINTERS

PARALLEL 8K SPOOLER BIF2220	£59.95
PARALLEL 16K SPOOLER BIF2221	£69.95
PARALLEL 32K SPOOLER BIF2222	£79.95
PARALLEL 64K SPOOLER BIF2223	£109.95

ALL PRICES EXCLUSIVE OF VAT

DEALER ENQUIRIES WELCOME

IBEK SYSTEMS

**437 STONEY STANTON ROAD,
COVENTRY, WEST MIDLANDS**
TEL: 0203 661162

There are no better, faster, cleaner **PASCAL** or **FORTRAN** compilers available for computers than Pro Pascal and Pro Fortran.

Fact

Every comparative review undertaken by a computer publication endorses and establishes this as a...

Fact

Pro Pascal and Pro Fortran are available for **Z80** based machines running **CP/M** and **8086/8088** based machines running **MS-DOS (PC-DOS)** or **CP/M-86**.

Prospero

Languages for Microcomputer Professionals

PROSPERO SOFTWARE Ltd, 190 Castelnau, London SW13 9DH, Telephone 01-741 8531. Telex 8814396 PROSOF G

Please send me information on Pro Pascal/Pro Fortran

Name.....

Position..... COMPANY

Address.....

..... Postcode..... Telephone

PROSPERO SOFTWARE Ltd, 190 Castelnau, London SW13 9DH. Telephone 01-741 8531. Telex 8814396 PROSOF G.

Prospero software is obtainable from **XITAN**, **TRADESOFT**, **ARIES** and **MPI** in the UK, from **LIFEBOAT INC** in Japan, **LIFEBOAT ASSOCIATES** in New York, and other good distributors and dealers.

Expand Your PC To A Multi-User System With **Advanced Digital's** PC-Slave



Up To 32 Users

Expanding your PC to a multi-user system is easy. Simply plug in a PC SLAVE processor board and ASCII terminal for each user. With ADC's unique Master/Slave concept, each user runs independent of other users without speed degradation.

RTNX executive software turns your PC into a master processor and shares disks, peripherals and data with the slaves. ADC's **PC-File Server** provides you with additional expansion slots, hard disk drive and a high-speed streaming tape back-up for your IBM PC System.

PC SLAVE FEATURES:

- 8 MHz, 8088 CPU
- 256 kB of RAM, expandable to 768 kB
- Two Serial I/O Ports

**ADVANCED
DIGITAL
CORPORATION**

Advanced Digital Corporation, USA
5432 Production Drive, Huntington Beach, CA 92649
Tel. (714) 891-4004 • Telex 183210 ADVANCED HTBH

Advanced Digital U.K. Limited
27 Princes St., Hanover Square
London W1R8NQ • United Kingdom
(01) 409-0077 • (01) 409-3351 • Telex 265840 FINEST

*RTNX is a trademark of LOGICRAFT
*PC-DOS is a trademark of International Business Machines
*MS-DOS is a trademark of Microsoft Corporation
*LOTUS 1-2-3 is a trademark of Lotus Development Corporation
*Multi-Plan is a trademark of Micro Soft Corporation
*WordStar is a trademark of MicroPro Corporation

ADVERTISERS INDEX

A			S		
ABA	23	Duckworth	19	Media and Software Centre	37
ABM Computers	57	Duplex Communications	58	Memorex	84/5
Adder Publishing	245	E		Mercator	127
Adelphi Business Computers	131	Electroconsult	38	Metacomco Marketing	33
ADS Computing	245	Electronequip	91	Micro Computer Consultants	25
Advanced Input Devices UK Ltd	243	Erima	16	Micro Computer Services	253
Alfa Gat	4	Ewart Microsystems	59	Micro General	10
Amstrad Consumer Electronics	112/3	Express Computer Consultants	26	Micro Peripherals	I.B.C.
Arnor	86	F		Micro Processor Engineering	31
Ashgold Business Computer Ltd	35	Fraser Associates		Microrent	46
ATT	7	F. S. Enterprises	147	Micro Resources	42
Axis	50/1/2/3	G	38	Micro Time International	77
B				Microvitec	70
BBC Publications	127	Gandalf Digital Communications		Microworld	29
Byteshops	34, 56	Garwood (Wholesale) Ltd	74	Micro-X	8
C			90	Mighty Micros	75
Cambridge Computer Store	62	Gorlitz Computerbau	134	Miracle Technology	78
Cambridge Micro Centre	114	H		Mirrorsoft	139
Cambridge Micro Electronics	83	Handic Software	47	Monitor	243
Cash and Carry Computers	59	HCCS	25	Morgan Camera	258
CCA	107	Hewlett Packard	155	Morse Computers	107
Centronics	39	Hisoft	32/60	N	
Chester Computer School	81	Hitech Electronics	131	New Horizons	251
Choragraphics	256	Homestead Electronics	35	O	
CISS	107	I		01 Computers	5
Comart	20	Ibico	54	Office Equipment Marketing	248
Compaq	96/7	Interface Networks	139	Oki Electric Europe	244
Compshop	247	Insurance Solutions	23	Opus Supplies	12/28
CPS Data Systems	105	J		Oxford Computer Systems	48/9
Crestmatt	17	Juki		P	
Cumana	170	K		Pam Computers	127
D				P.C Communications	82
Dataprofile	46	Keelecodes	8	Penguin Books	131
Datastar	19/21	KGB Micros	109	Personal Computers Ltd	OBC
Datasoft	75	Knights TV and Computers	83	Philips Business Systems	151
Datastore	59	L		Pinner Wordpro	43
Dateline	104	Lantech Information Systems Ltd		Pony Microsystems	31
Davinci Computer Store	239	Lasky's	19	Power Testing (UPS) Ltd	61
Daystar Computers	127	London Computer Centre	44/5	Probe International	88/9
Dennison Manufacturing Co Ltd	75, 77, 79	M	15	Prospero Software	303
Digisolve	212, 83	Mailadisk		Q	
Digithurst	7	Mam Executive Computer Services	61	Quest	103
Digital Solutions	95	Mayfair Micros	240	R	
Digitask	262	Mancos Computers	62/264	Rapidata (Newbury) Ltd	35
Digitus	1	Mannesmann Tally	58	Reed Exhibitions	116
Direct Disk Supplies	55	Map 80 Systems	191	Relative Marketing	143
Discotechnology	259		38	X	
Disking International	68/9, 72/3			Xebec	41

MICROMART ADVERTISERS INDEX

A			F		
A C Computers Ltd	220	Figure Flow Ltd	224	Micro Processor Engineering Ltd	222
Actel	234	G		Micro Star	214
A Line Computer Systems	215	GCS	230	Monolith	233
Alliance Computers Ltd	224	Grey Matter	219/221/223/225/227/229	Morgan Camera	232
Altek Instruments	217	H		N	
Anita Electronics Services Ltd	226	Harrison Ward Assoc Ltd	225	Newcastle Computer Services	230
B			227	P	
Barley Mow Workspace	235	H E & P	231	Peterson Electronics	227
C			219	Photographic & Optical Services	237
Cairn Associates Ltd	218	Hilltec Electronics Ltd	219	Portfolio Software	221
Citrik	226	Hoodless Associates		Professional Magnetics	228
Computer Books	217	J		Protos	236
Commonside	226	JCS Software	232	S	
Conguin Software	225	K		Saltigrade	233
C. Ram	214	Kingsley Enterprises	232	Sharp, Speed Products	222
D				Simple Solutions	218
David Nissen	214	K K Stationery		SMC Video	223
Deltatek	233	M		Software Technology	231
E				Steve Betts Software	224
Elstree Computer Centre	220/236	McGraw Hill	234	Strong Computer Systems	228
		Micro Arts	223	Supersoft	229/230
		Microcomputer Services			
		Micro Media	215		
T			W		
Trisoft	216			W D Software	228
Typro	229			William Stuart Systems	235
V			EDUCATION		
Valewells Ltd	216			C Tec	
W				David Game Tutorial College	
W D Software	228			Dean Associates	
William Stuart Systems	235			GCE Tutoring	
EDUCATION				Ibbotsons Design Software	
				London Electronics	
				Microcomputer Advisory Centre	
				Microteach	



CHIP CHAT



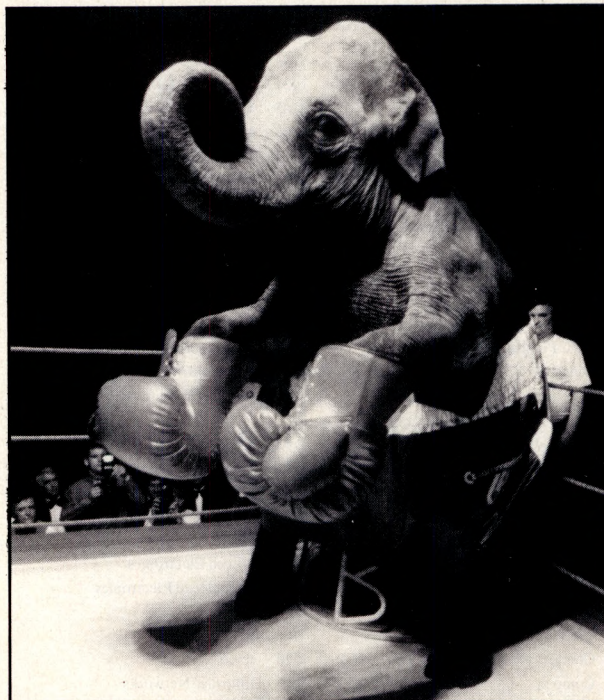
It's a man's life in micro manufacturing: Chris Curry's birthday celebrations are likely to be quieter this year than last when guests at the Curry mansion had an eventful time. Their meal was eaten to the accompaniment of various ghost noises, slime seeping through the floorboards and collapsing curtains. Those who made it through to the last course were relieved to find that the 'ghosts' had in fact been hired for the evening. All this was mild stuff compared to the Acorn boss's original idea — he wanted a squad of SAS-style troopers to come bursting in through the windows.

Many happy returns: Clive Sinclair got into the spirit of Christmas by pursuing Chris Curry round various Cambridge pubs. Tempers, newspapers — and in some reports even fists — were raised in anger as the two disagreed about their respective machines'

reliability. An irate Sir Clive is the last person we want to meet in our local — but we have to point out that the blurb on one game we received recently says, 'to achieve reliable microdrive operation, please format each new microdrive cartridge at least 20 times before use.'

Trigger happy: not to be outdone, Commodore made its own contribution to capturing the true spirit of Christmas. It sent out a card depicting the three wise men and the Star of David. To add a touch of spice, one of the wise men was shown zapping the Star.

Frosty: Atari's gesture of goodwill was similarly in tune with the spirit of the times. The company reportedly laid off more than 200 people at its Irish video games factory before Christmas. Jack the knife in action. Still on the subject of Jack Tramiel, the new Atari machine previewed in this issue is seen as a rival to Apple's Macintosh — and



Maureen the elephant's days as a TV star are over. Commodore came up with the bright idea of using Maureen to represent the 64's giant memory, but animal-lovers weren't impressed. Commodore insists that the RSPCA knew about the ad and let it go through — and that the campaign had run its course anyway. Either way it's back to the big top for Maureen.

Generations of dogs can't be wrong.



This heart-warming scene is the latest advertisement for Winalot. At least we think it's for Winalot — it might well be for the micro featured, which is Sharp's MZ5600. The dogs look as puzzled as we are. Any suggestions as to what they might be thinking are welcome, and the best will win £10. Send your suggestions on the back of a postcard to ChipChat, PCW, 62 Oxford Street, London W1, to reach us by 28th March. Remember to include your name and address. And congratulations to Bob Smith in Norway for his December winner.

has already been dubbed the 'Jacintosh'.

Three wheels on my wagon: the best aside we've heard about Sinclair's new car runs as follows: 'Guaranteed to get you there in less than 28 days'.

No hairs on them: Electronic Data Systems likes to get the important details right — such as insisting that its staff be clean-shaven. No details are available of what happens to staff who prefer to stick to their beards, although if you see any male faces covered with cotton wool sympathy might be in order.

It never rains, but it pours: a consoling thought for those who suffered through the cold January. The story goes that the plumbing in Clive Sinclair's London house burst, resulting in inappropriate waterfalls in all the wrong places. At least Sir Clive kept his sense of humour. He blamed the problem on low technology.

Acronym-happy: others with a sense of humour include software houses Quicksilver and Bug-Byte, who joined forces to announce their awards for the computer industry. The award for the 'Biggest United Liaison of Leading Suppliers of Hardware Innovative

Technology' went to the MSX manufacturers.

Black marks: Amstrad's move into micros hasn't all been plain sailing. In fact the company keeps a black book with the names of all the people who haven't been helpful along the way, Micropro included. And Amstrad says that it has got WordStar running on its drives — with a little bit of tweaking of the software.

Enterprising: being privatised has obviously gone to British Telecom's head. It's selling its own version of ICL's OPD — called Tonto. If BT really thinks that Red Indians are the market of the future or that all businessmen see themselves as Lone Rangers in search of an assistant, now might be a wise time to sell those shares.

Time's up: the questionnaire in our January issue didn't impress one of our readers. He wrote to the market research company concerned to point out that if he answered all the questions he wouldn't have time to use his micro, make money, or read magazines — let alone breathe. As money was going to charity for all the questionnaires returned he decided to send in 10p instead.

END

Affordable and reliable printers from **Micro P** give you more ^{Quality} CPS for your money



Even in today's high tech world, for most of us, the written word is still the least expensive means of sending and receiving information. If you own a microcomputer the chances are that sooner or later you are probably going to need a printer.

Micro P — CPP40

A low cost 4 colour 40/80 column printer/plotter capable of printing text or graphics on plain paper. The CCP40 is an ideal companion for small and portable micro's, as it is fitted with re-chargeable batteries — perfect for beginners.

Micro P —SHINWA CPA80

With 100 cps quality printing, the CPA80 probably gives more cps/£ than any other printer available today. The CPA80 is packed with features you would normally find on a more expensive printer. With an optional RS232 version available (even for the QL) this Epson compatible printer will hook up to almost any micro.

See them at your local dealer today!

Micro P — MP165

Looking for a matrix printer as well as a daisywheel? Well, the MP165 combines all the attributes of these two technologies to give a matrix printer capable of printing at up to 165 cps, as well as providing crisp Near Letter Quality, (NLQ) print at 75 cps. Features include a 2k buffer as well as both friction and tractor feed, as standard. Ideally suited to most popular micro's, the MP165 is now available in a new RS232 QL compatible version.

**Micro
Peripherals Ltd**

'THE POWER BEHIND THE PRINTED WORD'

INTEC UNIT 3, HASSOCKS WOOD, WADE ROAD,
BASINGSTOKE, HANTS. ENGLAND, RG24 0NE.

Telephone: BASINGSTOKE (0256) 473232 (32 lines).

Telex: 859669 MICROP G Facsimile: 0256 461570

* Full 12 months warranty - RRP ex. VAT. QL is a registered Trade Mark of Sinclair Research.

Personal Computers Ltd.

Macintosh[™] Centre

(first again)

Personal Computers Ltd, the U.K.'s first personal computer dealer has done it again! First in the U.K. with Apple Computers — first in the U.K. with Lotus 1:2:3 software — and now another first, the brand-new Macintosh Centre open in the heart of the City of London.

Macintosh is the new computer sensation from Apple, designed on the simple premise that a computer is a lot more use if its easy to use. Computers have little value if they require thirty manuals to figure out and a doctorate in mathematics to operate. Ideally, working with a computer should be like talking to a very bright friend who is eager to help get your work accomplished — and that's Macintosh.

With Macintosh you can write, analyse, organise, create and illustrate, often at the touch of a finger, by moving a 'mouse' on your desk to move a pointer on the screen. It can also help you prepare letters, reports, produce charts and presentation slides, store and retrieve information. And much more.

This doesn't just mean your work will be faster and more accurate — it will also be better. And remember the less time you spend shuffling papers — the more time you have available to exercise your creativity.

Macintosh takes over your deskwork, but not your desk. In fact it takes up an area as small as a standard sheet of paper.

Macintosh has a wide range of software available, and new packages are being added all the time. In addition to Mac's own software which includes MacPaint, MacWrite, MacDraw and MacProject, there's world-famous packages from Microsoft — like Multiplan, Chart, Word and File, and the best-selling Filevision — you'll find them all at the new Macintosh Centre.

Macintosh — recently voted best value personal computer by 'Which Computer' magazine, source: 'Which Computer' survey August 1984 who called it "an unbeatable buy".

Let us put a mouse in your hand, and show you the capabilities of this exciting new computer. Call in at the new Macintosh Centre, 218 Bishopsgate, London EC2M 4JS or for further information call the Mac Hotlines on 01-377 1200 today!

Personal Computers Ltd.

218 & 220-226 Bishopsgate, London EC2M.
Tel. 01-377 1200

